

Urban Forests
Analyzing the Influence on Psychological
Well-Being

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Zusammenfassung

Der Einfluss von natürlichen Umwelten auf das psychische Wohlbefinden gewinnt aufgrund einer steigenden Urbanisierung in Europa an Bedeutung (United Nations, 2004). Gerade durch die stetig zunehmende Siedlungsfläche in der Schweiz (BFS, 2007) steigt die Bedeutung natürlicher Aspekte innerhalb bebauter Umwelt. Zur Unterstützung der öffentlichen Gesundheit und das Wohlbefinden der Bevölkerung sollten bei der Gestaltung von urbanen Umwelten Naturaspekte berücksichtigt werden.

Diese Arbeit befasst sich mit dem Vergleich der Wirkung von urbaner und natürlicher Umwelt sowie der Differenzierung unterschiedlicher natürlicher Umweltbedingungen. Nach der Darstellung des theoretischen Hintergrundes und methodologischen Überlegungen gibt Kapitel 3 einen Überblick über den Stand der Forschung, die sich mit dem Einfluss von natürlicher Umwelt auf den Menschen befasst. Den theoretischen Hintergrund stellt die Erholungspsychologie dar, insbesondere die Aufmerksamkeits-Erholungs-Theorie und die Stress-Reduktions-Theorie sowie integrative Ansätze beider Theorien. In experimentelle Studien dominiert der Vergleich von urbaner und natürlicher Umwelt. Ein konsistent positiverer Einfluss der natürlichen Umwelt wird deutlich, sowohl auf Erholung als auch auf psychisches Wohlbefinden.

Bei der Betrachtung unterschiedlicher natürlicher Umwelten sind die Befunde weniger konsistent: während einige Studien den besonders positiven Einfluss von wilder Natur auf das Wohlbefinden belegen, zeigen andere einen stärker positiven Wert gepflegter Natur. Das Stimulusmaterial der Untersuchungen gestaltet sich unterschiedlich: es variiert von schwarz-weiss-Fotos über Filmpräsentationen zu realen Naturbesuchen mit physischer Aktivität. Die Notwendigkeit einheitlicher Untersuchungsdesigns und Präsentationsmodi wird deutlich, um einen Vergleich der Ergebnisse zu ermöglichen.

Eine weitere Einschränkung der bisher vorliegenden Forschung ist das Erfassen von Wohlbefinden durch unterschiedliche Instrumente, die eine Vergleichbarkeit

zwischen Studienergebnissen erschweren. Die Kombination unterschiedlicher Aspekte von Wohlbefinden durch ein standardisiertes Instrument könnte einen Beitrag zur Vergleichbarkeit von Resultaten leisten.

Deutlich zeigt sich, dass natürliche Umwelten als Ressource für psychisches Wohlbefinden dienen. Eine Differenzierung des Effekts unterschiedlicher Naturzustände ist jedoch bisher nur eingeschränkt möglich. Diese ist jedoch unablässig für konkrete Planungsmassnahmen, die sich der Unterstützung von psychologischem Wohlbefinden verschreiben.

Kapitel 4 beschäftigt sich mit der Frage, welche kognitiven und affektiven Prozesse in natürlichen Umwelten ausgelöst werden, die zum Wohlbefinden beitragen. In einem explorativen Design werden mentale Modelle rekonstruiert, die die Wirkung von wildem und gepflegtem Wald und Offenland betreffen. Halbstrukturierte Interviews mit Strukturlegetechnik wurden durchgeführt mit Personen, die unterschiedliche Erfahrungen und Expertise mit Natur besitzen. Die Ergebnisse zeigen, dass bestimmte Voraussetzungen für einen positiven Effekt auf Wohlbefinden erfüllt sein müssen. Zu diesen Voraussetzungen zählt die Nutzbarkeit von Natur, bestehend aus der physischen Zugänglichkeit und der Möglichkeit, sich in der Naturfläche frei zu bewegen. Dies deutet darauf, dass gepflegte Naturflächen positiv auf das menschliche Wohlbefinden wirken. Der Kontrast zum Alltagserleben führt zu einem Wechsel des Gedankenfokus, dem Kernpunkt der positiven Wirkung auf das Wohlbefinden. Er vollzieht sich zum einen durch das Abschalten von täglichen Sorgen und zum anderen durch einen Perspektivenwechsel. Die Folgen davon sind Beruhigung, der Anstieg guter Laune und das Sinken von Deprimiertheit und Ärger. Diese Aspekte von psychischem Wohlbefinden wurden in einer experimentellen Studie überprüft. Wohlbefinden wurde vor und nach einem Waldspaziergang erhoben. Die Ergebnisse bestätigen die in den qualitativen Interviews erwähnten Prozesse zum Teil. Die positiven Dimensionen des Wohlbefindens, "Ruhe" und "gute Laune", wurden positiv beeinflusst durch wahrgenommene Artenvielfalt, während die negativen Dimensionen des Wohlbefindens "Deprimiertheit" und "Ärger" eine signifikante Abnahme in Abhängigkeit vom Gedankenfokus zeigten: je mehr sich die Personen gedanklich mit

der Natur beschäftigten und je weniger der Fokus auf Arbeit lag, desto stärker sanken "Deprimiertheit" und "Ärger".

Auf der Grundlage der Kapitel 3 und 4 beschäftigt sich Kapitel 5 mit drei Forschungsfragen. Die erste Frage betrifft den Vergleich der Wirkung von wildem und gepflegtem urbanen Wald hinsichtlich der Wirkung auf psychisches Wohlbefinden. Die zweite Frage widmet sich möglichen zusätzlichen Einflussfaktoren wie der Bewertung von Natur, die möglicherweise den Effekt von natürlichen Umwelten auf das Wohlbefinden beeinflussen. Die dritte Frage geht dem aktuellen Trend von Studien nach, die sich dem individuellen Bedürfnis nach Erholung widmen und untersucht, ob die Wirkung von Natur durch das Bedürfnis nach Erholung beeinflusst wird.

In einem experimentellen Design (N = 96) werden Untersuchungsteilnehmer zufällig zu einem wilden oder einem gepflegten Waldspaziergang in Zürich zugeordnet. Multidimensionale Befindlichkeitsskalen (Abele-Brehm & Brehm, 1986) erfassen Wohlbefinden vor und nach dem Treatment.

Die Ergebnisse zeigen, dass wilde und gepflegte Wälder einen unterschiedlich starken Einfluss auf das menschliche Wohlbefinden ausüben. Gepflegte Wälder wirken, zumindest kurzfristig, positiver auf psychisches Wohlbefinden. Gepflegte Wälder zeigen einen stärker positiven Effekt auf den Dimensionen "Ruhe", "gute Laune" und "Deprimiertheit". Dieser Effekt ist unabhängig von der individuellen ästhetischen Bewertung der Naturfläche und von der Herkunft der Teilnehmenden.

Die Dimensionen "Aktiviertheit" und "Energielosigkeit" zeigen sich vom Bedürfnis nach Erholung abhängig: stärker ermüdete Personen profitierten leicht stärker als weniger ermüdete Personen. Ermüdung hat keinen Einfluss auf weitere Wohlbefindens-Dimensionen. Dies legt nahe, dass Wohlbefinden und Erholung unterschiedliche Konzepte darstellen, die bei der Planung natürlicher Umwelt einbezogen werden müssen. Ein Ausblick auf weitere mögliche Forschung sowie die Implementierung der Ergebnisse wird gegeben.

Abstract

With an increasing urbanization in Europe (United Nations, 2004) the impact of natural environments on human health is gaining importance. As urban structures grow in Switzerland, the importance of natural areas in urban environments gets more important (BFS, 2007). In planning processes, natural areas should be considered, especially if they are able to support public health and well-being.

This thesis deals with research addressing the comparison of urban and natural environments and the differentiation of diverse natural environments.

After showing the theoretical background and methodological considerations, chapter 3 gives an overview on the research concerned with effects of natural environments on humans. Mostly going back to theoretical approaches of Attention Restoration Theory, Stress Reduction Theory and integrative approaches, the experimental studies report on the positive affect of natural compared to urban environments consistently. Concerning different natural environmental stimulation, there seems some inconsistency, especially on wild versus tended natural conditions and their effect on well-being. While some studies find wild natural areas especially positive for well-being, other studies underline the positive influence of maintained nature.

The stimulus material of the studies varies from photographic black-and-white-slides to the real exposure in nature including physical activity. A more coherent research design concerning presentation modes needs to be invented in order to compare findings.

Natural environments can serve as a resource for well-being. However, more work needs to be done on the effect of different natural environments, which can provide important information to actually design environments including characteristics and aspects with a positive impact on psychological well-being.

Chapter 4 addresses the question, what kind of cognitive and affective processes influencing well-being are initiated by different natural environments. In an

explorative design, processes released by different natural environments were focused, comparing wild and tended forests and open land. Looking at users' ideas about the relationship of natural environments and human well-being, cognitive and affective processes released by different natural environments are analyzed. Semi-structured interviews were carried out and mental structures were reconstructed ("Strukturlegetechnik") with users containing a diverse background towards natural topics. Reconstructed mental models indicate that there are important preconditions for the environment to influence well-being. A precondition is usefulness, divided into accessibility and the freedom to move in the area without limitations. This indicates that maintenance is positively affecting human well-being. The contrast to daily life arises, subsequently leading to a change of mind. The change of mind is divided into two processes, the drifting away from daily concerns and the change of perspectives, which can both happen subsequently or only one at a time. Consequences mentioned by the interviewees were tranquilization, an increase of good mood, and a decrease of concerns and depression. These aspects of well-being were tested in an experimental design, measuring the differences of well-being after a walk in the forest. The results proved the existence of the processes mentioned in the interviews. However, the positive dimensions "calmness" and "good mood" did not get affected as much as the negative dimensions. "Depression" and "anger" were shown to decrease significantly, depending on the amount of natural and urban stimuli perceived, the accessibility and the focus of mind.

On the basis of chapter 3 and 4, chapter 5 is dedicated to three research questions, arising out of recent research developments. The first question is concerned with a comparison of the impact of wild and tended urban forests on human well-being. The second question takes into account additional aspects such as the individual aesthetic assessment of environments and its possible effect on well-being. Question three follows a recent trend of research, asking if there are different effects depending on individual restorative needs.

In an experimental design with $N = 96$, participants were randomly distributed to either a wild or a tended forest walk in the area of Zurich, Switzerland. Well-being was assessed self-reported by a multidimensional, standardized instrument. Tended

forests showed a more favourable effect on well-being, in the dimensions "calmness", "good mood" and "depression" after the short-term treatment. The effect proved to be independent from the individual aesthetic assessment of the natural area. Furthermore, it is shown that the restorative dimensions "activation" and "lethargy" depended on the restorative needs: fatigued persons showed a stronger positive impact after the natural treatment than less fatigued person. Other well-being dimensions were not different between the fatigue and no fatigue condition, showing there are two different concepts, which have to be looked after when implementing results into planning processes. An outlook for further research and possibilities to implement results is given.

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Zusammenfassung

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1 Introduction

The proportion of the world population living in cities has been increasing dramatically, from an estimated 30% in the 1980s, through 50% in the new millennium, to a projected 70% in 2025 (United Nations, 2004). In Switzerland, the proportion of the population living in cities is 75% already (BUWAL, 2005). Urban environments are often characterized by noise and crowding. They force individuals to be highly attentive in order to orient themselves in the environment and to avoid accidents. Regeneration processes are considered to be especially relevant for people living in stimuli rich urban environments, as the regeneration of their attention capacity can decrease the likelihood of them being involved in accidents. Eventually this will lead to a decrease of public costs for the cure and rehabilitation of injuries. Thus, there is a close link between environment and health, and restoration in nature is one possibility that has been recently discussed to support human health (e.g. Bonaiuto, Fornara & Bonnes, 2003; De Hollander & Staatsen, 2003; Richmond, Elliott, Matthews & Elliott, 2005; Van Kamp, Leidelmeijer, Marsman & de Hollander, 2003). People living in urban environments need escape facilities to recover from the manifold stimuli they receive in urban environments (Guite, Clark & Ackrill, 2006).

The debate about recreation opportunities for people living in urban surroundings has been growing in the last years (Constanza et al., 2007). The relationship between natural environments and health has been analyzed in epidemiological studies (De Vries, Verheij, Groenewegen & Spreeuwenberg, 2003; Verheij, 1996), indicating that people living in neighbourhoods close to green space tend to be healthier than people without green space close by. Accessible public natural spaces can help lower the costs for stress-related illness, because the more often residents visit urban green spaces, the less stress-related illnesses are reported (Grahn & Stigsdotter, 2003). Thus, natural environments can apparently actively support human health.

While urban environments are not adequate to foster restorative needs of people after a day of work, natural environments offer the opportunity to regenerate from daily

problems and stress (Hartig, 2007). The need for nearby natural areas for recreation is rising (Ammer & Proebstl, 1991). In particular, the function of nearby areas, such as parks, lakesides and forests, for attention restoration in daily life should be focused to create daily opportunities for psychological well-being as a contribution towards public health.

The design of natural areas needs to be tailored to support and maximize this restorative and well-being effects for an urban population. Landscape attributes, which support restoration and well-being have to be identified on a level which is applicable for tangible design strategies and actions (Jensen & Ouis, 2008).

1.1 A brief overview of the theoretical framework

1.1.1 Health and Psychological Well-being

A universally accepted definition of the concepts health and well-being has not yet been formulated, because the concepts are influenced by different theoretical approaches. For a long time, the biomedical model of health, which defined health as the absence of disease, has been dominating. However, this definition excludes the influence of subjective experience on health, and the physical and psychological components were strictly separated (WHO, 1948; Ziegelmann, 2002). Since the 1970s, there is a tendency to move away from the approach focusing on deficits towards approaches focusing on positive factors supporting health, such as coping strategies and resources (e.g. Antonovsky, 1979). Psychological well-being is a crucial aspect of health, as it is shown to be a strong predictor for overall health (Goodwin, 2000; Seymour, 2003). Psychological well-being represents the subjective aspect of individual experiences while integrating positive psychological and physical sensations as well as the positive assessment of the individual's own life or parts of their life (in summary Diener & Lucas, 2000; Kahnemann, Diener & Schwarz, 1999). Well-being cannot be observed or measured physiologically (Abele-Brehm & Brehm, 1986), or excluding subjective experiences (Mayring, 1991b;

Becker, 1994). Subjective factors are increasingly considered, because objective indicators often fail to be effective predictors for subjective well-being (see Diener, Oishi & Lucas, 2003).

An approach to operationalize the concept of well-being has been established by Abele-Brehm and Brehm. Their construct well-being describes the momentary, current psycho-physical condition of a person, which, unlike traits of personality characteristics, is not stable over a long time but strongly influenced by external and internal factors (Abele-Brehm & Brehm, 1986).

Well-being is operationalized as a two-dimensional construct. "Tension" represents the affective component, while "evaluation" represents the cognitive component, as shown in figure 1.1.

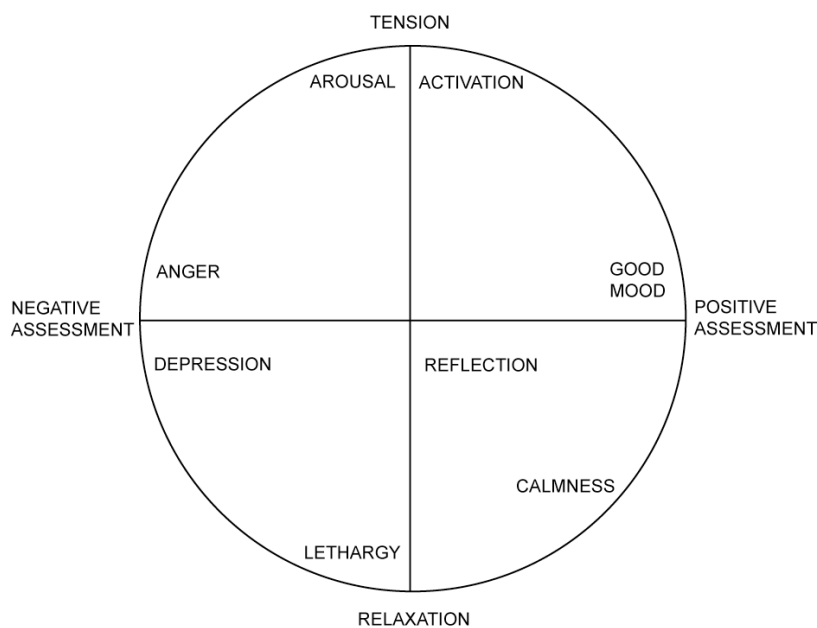


Figure 1.1: The orbital model of well-being (adapted from Abele-Brehm & Brehm, 1986)

The four segments arising from the two dimensions in the orbital model are each operationalized by two mood aspects (positive tension, positive relaxation, negative tension, negative relaxation), which represent the mixed conditions of the basic dimensions:

- "Activation" and "good mood" represent the segment of positive tension
- "Calmness" and "reflection" represent the segment of positive relaxation
- "Lethargy" and "depression" represent the segment of negative relaxation
- "Anger" and "arousal" represent the segment of negative tension

Precise attributes of each dimension allow the measurement of well-being (Abele-Brehm & Brehm, 1986). This model represents the subjective dimensions of well-being focused in this work. In the context of natural environments, we need to focus on concepts of recreation, which can be faced as a precondition for well-being. This will be the subject of the next subsections.

1.1.2 Do natural areas contribute to human recreation processes?

Recreation is the balancing process needed after cognitive or physical activity and stress (Allmer, 2002). The process of recreation is split into three phases: distance, regeneration and orientation, which follow each other sequentially. The first phase involves "gaining distance" from a situation and is followed by the "regeneration phase", serving the recreation of psychophysical functioning and subjective well-being. The following "orientation phase" is characterized by gathering energy and psychophysical functions, including emotional and cognitive orientation for the following demands (Allmer, 2002).

The influence of physical environments on recreation processes has been gaining attention in the last years. The theoretical background is dominated by two approaches that deal with conditions in environments that lead to recreation or restoration processes.

1.1.3 Attention Restoration Theory

A theoretical approach addressing the effect of physical environments on people is the Attention Restoration Theory by Kaplan and Kaplan (1989). They describe restoration as the process of regaining cognitive capacity, which have been fatigued by cognitive demands. Restoration is merely the renewal of resources and does not

include the gaining of new competencies. This conceptual framework follows an idea that goes back to William James (1892) suggesting that people's attention can be divided into involuntary and voluntary attention.

Involuntary attention does not require any effort and automatically arises in interesting or exciting situations. Voluntary attention, or directed attention (Kaplan, 1995) is needed in situations when a person needs to pay attention to a topic that is not attracting the the observer's whole attention by itself. For directed attention, a high amount of effort is needed to suppress distractions, which compete with the less interesting topic. Other stimuli need to be inhibited to be able to concentrate on the topic. This inhibition of everything else around the questioned stimuli needs effort, and thus causes mental fatigue.

After a cognitive performance demand that required directed attention and resulted in fatigue, involuntary attention leads to the recovery from mental fatigue, because the directed attention is not involved and restores. Kaplan and Kaplan (1989) suggest that natural environments attract involuntary attention in particular, thus recovering the capacity of directed attention.

Kaplan and Kaplan point out that it is necessary to recover from attention fatigue and propose specific characteristics of environments which are able to evoke involuntary attention. The four main components proposed are "Being Away", "Extent", "Fascination" and "Compatibility".

Being Away, or escape, refers to the absence of everyday aspects, such as work, traffic and routine. Being away describes the distance from tasks and mental efforts of any kind, including the aspects of getting away from distraction, from routine and from pursuing certain purposes. The strongest effect is expected if all three aspects are involved. However, this component does not necessarily have a restorative output if the other components are missing.

Extent, or coherence, is the perceptual experience of the environment as being coherently ordered and of substantial scope and is coupled with the perception of

being in a whole other world, including having a wide scope as well as the connectedness with one's own mental ideas.

Fascination refers to stimuli, which attract ones' interest. It forces involuntary attention without the need for directed attention. Fascination is a process, although it is more than a single stimulus but rather a framework of a whole scene that is experienced coherently. The person is driven by effortless attention that focuses on inherently interesting characteristics. In empirical studies, fascination has been found to be the most important factor of restoration (Laumann, Garling & Stormark, 2001; Kaplan, 1995).

Compatibility between environmental patterns, the person's inclinations and the required actions is also needed for the restoration of attention fatigue. Essentially, this means that environmental stimulation has to match the purpose of the user and has to provide information enabling the person to engage in the intended activities.

Kaplan and Kaplan propose that these four components have a positive effect on restoration if they all appear at the same time in physical environment. The effect of only one or two components does not necessarily cause restoration from attention fatigue. The characteristics can be apparent in different environments, but natural environments in particular provide the presence of many characteristics comprising these four restorative components. Thus, natural environments have the potential to attract involuntary attention and elicit restoration.

1.1.4 Stress Reduction Theory

The psycho-evolutionary Stress Reduction Theory of Ulrich (1983) is another important approach, which has been shaping restoration psychology sustainable. Ulrich states that environments, which represent characteristics that would enable a person to naturally survive in the area, lead to physiological activity and positive affective responses, and eventually causing aesthetic preferences. This results in stress reduction. The process is evolutionary influenced and it is not necessarily

conscious for the person perceiving the environment. The reaction can occur before the individual judgement of the scene has been made.

Ulrich proposes that environments, which elicit initial affective reactions and minimal cognition, are especially preferred and subsequently reveal stress reduction. He proposes that the following features are supportive for survival in natural environments and thus leading to preference and positive affect as well as the reduction of stress.

A moderate to high **complexity**, including structural ordered properties or patterns, leads to an accelerated recognition and identification and a positive affective reaction.

Focality is the degree to which a scene has a focal point or an object gaining the attention of the observer. A focal point leads to preference and positive affective reaction.

A moderate to high level of **depth** or openness, as well as a **ground surface texture**, affords accuracy of depth estimates and leads to the comprehension of three-dimensional features, thus enabling orientation and positive affect.

The **absence of threat and tension** is needed to avoid dislike and fear. The absence of threat and tension increases aesthetical preference and increases stress reduction.

Deflected vistas, which describe the line of sight deflected or curved, are an important signal for new landscape information beyond visual bounds. These lead to a cognitive process rather than an initial affective reaction eliciting anticipation.

Water features, unless it is storming, evoke quick affective reactions and aesthetic pleasantness, interest and tranquillity (Ulrich, 1983).

These characteristics explain peoples' preference for natural scenes. Psychological well-being directly follows after the preference reaction, albeit the person is aware of the preference reaction or not. Ulrich (1983) suggests that the aesthetic response is

associated with pleasurable feelings and reflects a positive relationship between preferences of environments and the effect on human well-being.

This statement is supported if aesthetic is defined as a human need, which leads to well-being if it is achieved in the living environment (Maderthaner, 1995). The psycho-evolutionary theory focuses not only on the perception of natural environments, but it enables prognosis about behaviour. People perceiving environments, where they had difficulties to survive, would show the impulse to escape, while people perceiving environments, where they could naturally survive, would be attracted to the environment, stay there and lose stress symptoms.

Ulrich postulates that the reaction of stress leads to a decrease of attention (Ulrich, Simons, Losito, Fiorito, Miles & Zelson, 1991). Stress reduction by environmental input is possible, if the characteristics are given. This consequently supports the affective reaction of the person and reveals psychological well-being (Ulrich, 1983).

1.1.5 Restoration Psychology: an Integrative Approach

The two approaches are not as contradictory as it seems in the first place (Kaplan, 1995). Restoration Psychology in general, including the theoretical background of both approaches, deals with human restoration of psycho-physiological stress, and demands conditions in environments that lead to restoration. Natural environments in particular have been considered a resource for human restoration: both theoretical approaches described, Attention Restoration Theory as well as Psycho-Evolutionary Theory, take a common perspective about natural environments providing specific characteristics that reduce stress and alleviate attention fatigue.

So far, these general restorative concepts are difficult to be applied in environments to promote restoration (Hartig, 2007). A more precise analysis of environments is needed to measure the optimum complexity or depth, and determine what features are fascinating and coherent. Different natural conditions need to be analyzed for their characteristics and for their output on affective well-being.

Hartig states that one experience in a natural environment will not promote long lasting positive health and well-being, but a cumulative effect will (Hartig, 2007). A cumulative effect appears if a person accesses environments of high restorative quality during periods when restoration can occur, such as when a person is mentally fatigued. However, the frequency and duration of a cumulative effect is not clearly defined.

To create ideal conditions for restoration to occur by designing urban or close-to-urban recreation areas, we focus on the mechanisms responsible for effects of natural environments on human well-being. This is possible by facing different natural conditions. As Switzerland is densely forested, and the population throughout the year visits forests very frequently (BUWAL, 2005) they must be considered as one of the most important areas for recreation and nature experience (Ammer & Proebstl, 1991). Thus, we focus on forests and different forest conditions in terms of maintenance, which is the subject of the following sections.

1.1.6 Different Natural Conditions: Wilderness Research

Wilderness is a relatively new phenomenon (Hunziker, 1997), which is gaining importance in central Europe, and in Switzerland in particular, because of a decrease of economically used natural areas (BFS, 2007; Gellrich & Zimmermann, 2007). Without any maintenance, many of the areas, which are not used economically, will transform into forest areas in few years. This process needs to be regulated and offers the chance of designing abandoned areas in order to promote psychological well-being, which is an important predictor for health (Verheij, 1996).

Wilderness is originally defined as the pristine nature condition, while secondary wilderness is the natural condition in an area that has previously been cultivated and is no longer maintained. Primary wilderness is typically not found in Switzerland, since mankind has influenced most areas at some time (Bauer, 2005). Therefore, we consider wilderness including all forms of natural areas, which are left to themselves, no longer influenced by people (Bauer, 2005; Hunziker, 1995).

Understanding basic processes on the social and psychological level of wilderness research allows an important contribution to integrate processes taking place in different natural environments and their influence on well-being. By integrating this knowledge into design processes of natural environments, these can be used as a resource for public health (Verheij, 1996). Besides aesthetic considerations about wilderness, there is some research on the psychological impact of wilderness. Wilderness is shown to provide important values for people, such as the need for solitude, the social output (Armstrong, 2000; Klausner, 1971), the reduction of stress by leaving urban pressure (Driver, 1972) and solving problems (Bandura, 1977, Bacon & Kimball, 1989; Hartig, Mang & Evans, 1991), the confrontation with individual fear and physical challenge (Newman, 1980) and the change of self concepts and social behaviour (Bacon & Kimball, 1983; Gibson, 1979). But, at the same time, wilderness might also arouse negative outcomes concerning human health and well-being, such as fear (Milligan & Bingley, 2007), which need to be considered as well.

So far, it is not clear which tangible characteristics in nature provide the positive criteria, postulated by Kaplan and Kaplan (1989) and Ulrich (1983) that lead to the restorative effect. The perspective of different environments, such as wilderness, is a possible approach going beyond the natural-urban-comparison, which could provide extremes on a continuum. A variation of natural forms and conditions, namely wild and tended environments, is aimed.

Limitations of empirical research so far

The positive effect of wilderness has been shown in different empirical approaches. Since the research object is rather complex, it seems difficult to generate results under controlled experimental conditions and measure the effect on people without integrating a number of interfering variables. Thus, there have been methodological limitations to early research on wilderness. In field experiments, confounding variables make it difficult to identify causal relationships, such as the effects of wilderness experience and group activities (Kaplan, 1983). Another shortfall is the

absence of control groups (Gibson, 1979). Small samples lead to questioning whether they can be representative, and we realize that the selection of samples is dominated by student participants. A generalization of the findings needs to be proved (Zube, Pitt & Evans, 1983).

Another shortfall is the presentation of stimuli, which has been varying throughout the studies. Most studies used visual stimulation; some integrate auditory stimulation (Bishop & Rohrmann, 2003). The stimulation mode need to integrate the influence of activity by movement, which itself can have an effect on well-being (Allmer, 2002).

This thesis faces the effect of different natural environments on psychological well-being, addressing these research gaps. A comparison of wild and tended environmental conditions is moving away from the dichotomy between urban and natural, considering the state of the art in wilderness research. Activity will be included in the research design, and rather large samples will expand to non-student participants.

Results aim to show the specific effect of different degrees of wilderness or maintenance of natural areas in order to support planning processes. They provide information about the influence of specific natural environments on psychological well-being. This seems especially valuable for urban inhabitants, who have a high need for restoration. Besides the planning of given green areas in urban surroundings, the results can contribute to design processes of derelict land and urban natural space.

1.1.7 Structure of the research

After this short introduction into restoration psychology, chapter 2 gives insight into the methodological considerations in general. Considering the varying research questions, different methodological approaches were used, which will be explained in detail in the corresponding chapter.

Chapters 3 to 5 are concerned with different research questions focusing specific aspects of restoration and well-being in natural environments, providing original empirical work. These chapters provide research articles, which are submitted to

professional journals in the field of either environmental psychology or planning disciplines. The articles stand for themselves, including abstract, introduction, methods, results, discussion and conclusion. Table 1.1 shows the focus of each article.

Chapter 6 resumes the results of the empirical work described. Chapter 7 presents an overall conclusion, showing research and practical implications of the work.

Table 1.1: Overview of the research chapters

Chapter	Research questions	Aims
3 Submission to Environment International	What influence do urban and natural environments have on psychological well-being? What influence do different natural conditions have on psychological well-being?	Overview of the relevant definitions about urban and natural environments Trend of recent experimental research addressing effects on restoration and well-being Identification of limitations in previous research
4 Preparation for submission	What kind of cognitive and affective processes influencing well-being are initiated by different natural environments?	Development of a model about the relationships between natural exposure and well-being, including mental processes arising Testing the model for general validation
5 Submission to Journal of Environmental Psychology	Do wild and tended forest conditions influence human well-being differently? Does the aesthetic evaluation of environments have an influence on well-being? Do individual needs for restoration play a role in the effect of environment on psychological well-being?	Testing the effect of different natural conditions on psychological well-being by a field experiment

2 General methodological Considerations:

Triangulation of Perspectives

Choosing an appropriate methodological approach for the research questions, we considered qualitative as well as quantitative methodology. These paradigms at times seem contradictory and have been in conflict (Tashakkori, 1998). However, there are recent approaches integrating both methodological ideas to obtain a holistic view of complex research questions in social sciences, which opened the opportunity to integrate the advantages of both research traditions.

Qualitative approaches focus on the adequacy of methods towards the research objectives, the understanding of the world including thinking, emotions and behaviour of people (Mayring, 1991). The aim is to understand the research object as a whole in its daily context, to analyze the natural behaviour instead of analyzing the behaviour in isolated laboratory settings (Flick, 1999). An important advantage is the possibility to integrate individual perspectives of people involved. This opens up the opportunity to understand the relationship in a specific context and the experienced individual perspectives, enabling to explore new phenomena, integrating the complexity of the research object (Flick, 1999). Looking from this perspective, psychological research cannot be reduced to quantitative methods, which require a research objective that has to be operationalized in some way by reducing it to measurable variables.

But far from reducing the research to qualitative methodology, quantitative data are well needed to evaluate explorative statements. Generalizations are not possible and not aim of the process in qualitative data collection and analysis. In fact, the results arise from individual, explorative findings serving the aim to elicit hypotheses. These findings need to be tested in quantitative designs with a larger number of participants to be able to find general structures and causal relationships (Gutscher, Hirsch & Werner, 1996). These enable a generalization of results to large groups or

populations (Bortz, 1993), which is necessary for practical implications in decision processes.

These considerations lead to the choice of methodological perspective triangulation (Flick, 1991), allowing both the exploration of the research objective in a broad frame including a large number of context variables and individual perspectives and testing hypotheses with large samples for specific questions operationalized by precise variables allowing general statements. Thus, the research design is split into three subsequent phases, which deal with different research questions and thus include different methodological perspectives.

2.1 Literature review

A literature review serves the purpose of getting an overview of work, which focuses on the relationship between physical environments and aspects of human health. Since the research is manifold, pointing out to a strong interest in the topic, strict inclusion criteria were defined, focusing on experimental studies reporting on effects of physical environments on psychological well-being. Studies reported on in detail serve as a base for the subsequent empirical work by identifying research gaps and limitations.

2.2 Inductive approach

After screening and analyzing the literature on the topic, the question about influences of different environments on psychological well-being arises. Various studies focus on the consistent results of the superiority of natural compared to urban environments only, not focusing the specific processes involved. An inductive study

serves to elicit mental models about individual ideas people have about the relationship of environments on human health and well-being. A broad base of different ideas and aspects is aim of this part, which will be integrated in a general model.

Data collection has been carried out by the explorative method of half-structured interviews (Witzel, 1985) with a subsequent technique of reproducing mental structures ("Strukturlegetechnik"; Scheele, 1988), a procedure to allow for intersubjective reliability of results. Data analysis has been carried out by qualitative content analysis (Mayring, 2005).

From these qualitative data, hypotheses are generated and tested the subsequent quantitative phase. Both procedures will be explained as part of chapter 4.

2.3 Deductive approach

To test hypotheses arising from the explorative part, a deductive study was chosen. This serves the aim to operationalize variables found in the inductive phase and to generalize results to a broader public and situational frame. This is necessary if results shall be used for practical implication into the design of urban natural environments.

The data collection took place in an experimental field setting under controlled conditions. Using standardized scales and additional items in a pre-post-design with questionnaires, participants were randomly assigned to different treatment conditions in order to reduce the effect of possible confounding variables, which cannot be controlled in a field experiment. The procedure will be described in chapter 4 and chapter 5 in detail.

The data was analyzed by statistical analysis of variance, using SPSS (16.0 for Mac). The statistical analysis aims to generalize results in broader contexts. Statements about the relationship between different natural environments and psychological well-being are given.

These three empirical parts of the work complement each other and approve the demands for perspective triangulation systematically (Flick, 1991). A broad scope of the field of restoration psychology is given before an explorative phase shows the complexity of the field. After that one aspect gets analyzed in detail by a specific question and leads to generalizable statements.

The empirical body of the dissertation, composed of different methodological perspectives, will follow the structure presented in figure 2.1.

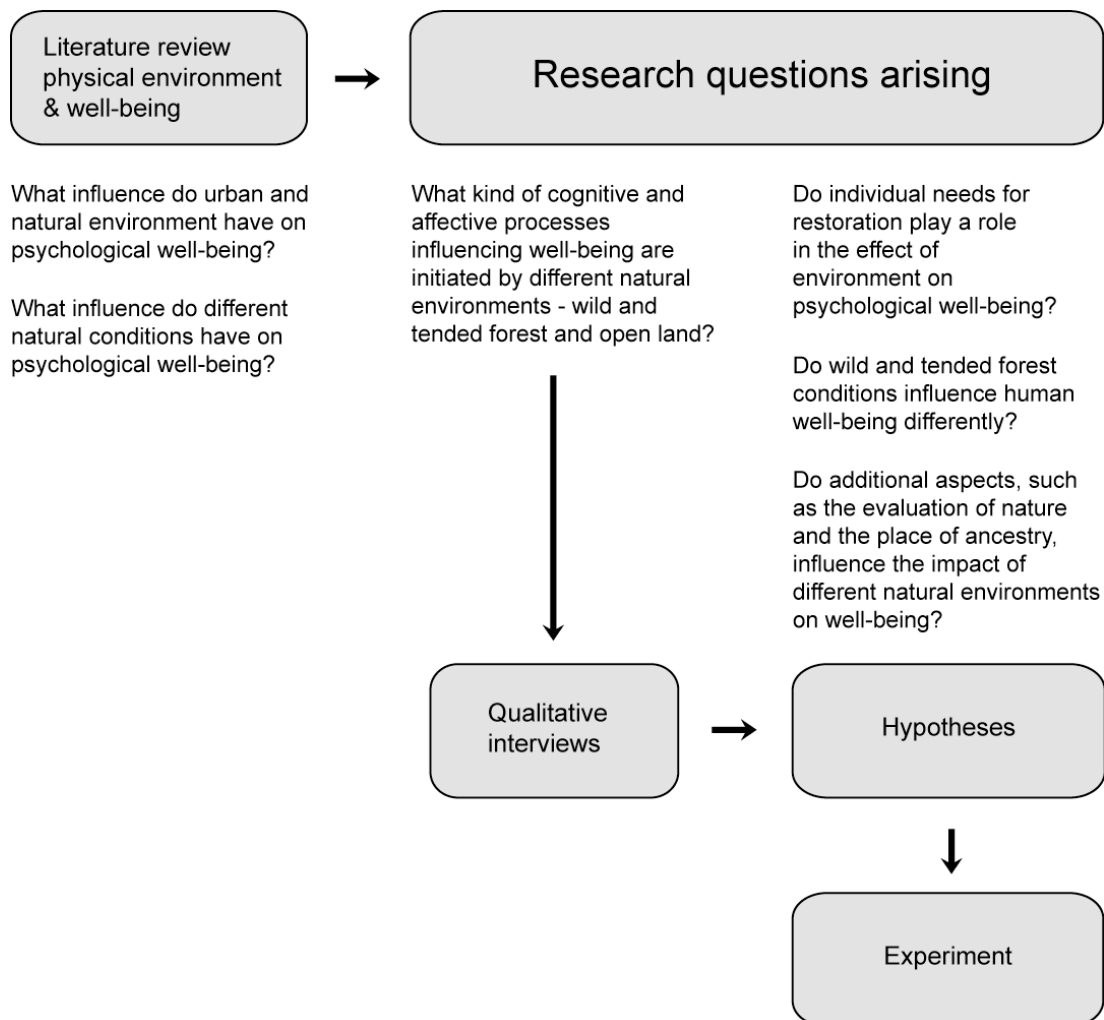


Figure 2.1: Overview of the methodological approaches

3 Natural Environments – A Resource for Well-being?

3.1 Abstract

Physical environment has a strong influence on psychological processes on the people perceiving it. This review focuses on causal effects of different environments on humans; restoration and well-being in particular. To analyze these effects, we address experimental studies only, allowing statements about direct influences of environments.

This specific scope of the review allows a comparison of the results elicited by different studies. The effects of environments on two main outputs get analyzed: restoration, measured by cognitive performance and perceived restoration, and well-being, measured by different standardized scales. A superiority of natural compared to urban environments gets obvious for both restoration and wellbeing, but we stress the question if this is due to a publication bias, having urban and natural environments representing extreme poles. For analyzing this question, we went a step further, facing studies that analyze the effect of different natural environments in the second part of the review. These show accessibility and signs of setting care in natural areas as important factors affecting human well-being positively, while a high density of natural areas show an inconsistent effect on well-being.

Methodological remarks on the studies reported are given, such as the various presentation modes of environmental stimuli and sample characteristics of the reviewed studies. However, the results of the reviewed experimental studies do not perfectly serve the aim to design natural environments supporting public health

yet. Detailed research addressing the specific effect of different natural conditions on peoples' well-being is needed to make practical suggestions for the design of natural spaces in order to support human well-being. Interrelations to preference measures are shown and discussed critically. These can actively support this design processes and are strongly encouraged to be integrated in further experimental research addressing the effects on restoration and well-being.

3.2 Introduction

An ongoing urbanization and an increasing densification in many European countries lead to an environment with a high amount of external non-natural stimuli. To cope with these conditions and prevent damage, urban residents need a high amount of attention, which eventually leads to attention fatigue (Hartig, 2007).

Ecological psychology integrates the impact of physical environment on human well-being and health (Fischer & Fischer, 1993) and thus has broadened the concept of health research in a practical way. Physical features can be focused as resources to support well-being, opening up the opportunity to optimize daily physical contexts in favour for public health (Fischer, 1994; Verheij, 1996). This perspective is of extreme importance for people living and working in urban contexts, who need regeneration of attention capacity. Regeneration possibilities, provided by the physical design of environment, can mainly contribute to public health by promoting restorative effects (Hartig, 2007). Abandoned land can provide such areas, but first we need to analyze how to design these in order to support public restoration and well-being, eventually leading to a positive effect on health.

Research on the effects of natural environments on human health indicators shows the superiority of natural compared to urban environments for stress reduction, restoration and well-being (Van den Berg, 2005; Van Kamp; Leidelmeijer, Marsman

& De Hollander, 2003; Velarde, Fry, & Tveit, 2007). Finding that natural environments have a positive influence on human health offers opportunities to promote public health by designing public areas naturally.

The mechanisms, which are associated with public health and well-being include the facilitating of exercise and social interaction as well as an increase of positive emotions (Day, 2008). While various studies analyze the assessment and individual preferences of natural environments and the expectations of users, these cannot give statements of the effects of environments. Thus, we strictly face the effects evoked by different physical environments. Studies analyzing the individual assessment of environments, e.g. by facing preferences, are integrated only as far as there is a link towards direct effects on people.

In this review we deal with the most salient research questions in connection with positive emotions arousing well-being and environmental development. We focus on the effects of physical environments on people, shown by two main questions:

What influence do urban and natural environments have on psychological well-being?

What influence do different natural conditions have on psychological well-being?

By focusing the effect of natural environments on humans and discussing results, contributions to planning processes and possible limitations can be made.

To clarify the scope of the article and to give a consistent basis of concepts for readers with an interdisciplinary background, we will start with brief definitions of the concepts.

Natural environments characterize areas dominated by natural vegetation. Urban parks and green spaces that are near natural, as well as meadows and forests accessible to the general public are included. We focus on urban and close-to-urban places that are accessible and usable for recreation purposes. We do not limit "natural environment" to distant, wild or "unspoilt" areas.

Urban environments represent environments dominated by built structures. These areas include streets and buildings with characteristic car traffic and people. Few natural elements might be visible in urban environments, but these do not dominate the scene. Urban environments faced here are accessible and usable for people for recreation purposes as well.

Human health is defined as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity, according to the World Health Organization (WHO 1948). This definition includes the subjective experience of health, enabling to move beyond a strictly medical perspective towards a multidimensional approach. Thus, positive factors influencing health, e.g. the physical environment, should be focused and analyzed.

Well-being is already included in the definition of health by the WHO. A common perspective, adopted by several authors, views "well-being" as a consistency of positive and negative affects of a person and their own evaluation of life (Kahnemann, 1999; Diener, 2000). The positive and negative aspects are flexible to situational changes, while the evaluative component is an important predictor of life satisfaction and fulfilment, a rather stable concept including emotional reactions, moods and judgments (Diener, Oishi & Lucas, 2003). Finding mostly cross-sectional experimental studies referring to well-being, we concentrate on studies sensitive to changes within a short period of time. The operationalization of well-being is dominated by self-report measures, usually based on multidimensional instruments.

Restoration describes the process of regaining physiological, psychological and social capacity, which has been diminished by everyday life demands (Hartig, 2007). According to Hartig, restoration needs two basic requirements: the absence of direct demands and the attraction and holding attention, pulling away thoughts from daily routines (Hartig, 2007).

3.3 Theoretical background

Physical environments can foster overall mental, social and physical well-being in an everyday context (WHO, 1986; Hornung & Gutscher, 1994). An appropriate design of exogenous attributes can thus promote public health, e.g. by ensuring access to open natural space for recreation purposes. Physical environment has to be considered more carefully to provide preventive and curative aspects of health care. Research on opportunities and constraints influencing human health and well-being has been dominated by the theoretical approaches of Kaplan (1995) and Ulrich (1983), which are outlined in the following sub-sections.

Attention Restoration Theory (Kaplan, 1995)

Everyday life in urban environments requires people to pay permanent attention in order to orient and to act in a world rich in external stimuli. This process is called "directed attention" and leads to attention fatigue. Involuntary attention, not requiring any effort, provides the opportunity to reduce attention fatigue. Attention Restoration Theory (Kaplan & Kaplan, 1989) postulates that especially natural environmental settings are likely to stimulate involuntary attention and thus enable restoration of directed attention. The process of restoration is possible, especially if the following characteristics are given in the environment:

"*Being Away*" refers to the distance from everyday aspects and from mental efforts of any kind, such as work, traffic and routine. "*Extent*" is the perceptual experience of the environment as coherently ordered and being in a whole other world. It includes having a wide scope and the connectedness with one's own mental ideas. "*Fascination*" refers to stimuli, which attract ones' interest. It forces involuntary attention, and the person is driven by effortless attention focusing on inherently interesting characteristics. "*Compatibility*" means that environmental stimulation has to match the purpose of the user and has to provide information enabling the person to engage in the intended activities.

Kaplan proposes the presence of these four components in physical environments to elicit a positive effect on restoration. Natural environments in particular represent these characteristics, thus they are suggested to have a positive impact on restoration.

Kaplan (1995) further distinguishes between hard and soft fascination arising in different environmental settings. Hard fascination describes an extreme, e.g. resulting from watching a car race, while soft fascination is moderate, accompanied by aesthetic pleasure and the opportunity for reflection, e.g. when walking in a natural setting. He proposes soft fascination to be responsible for an enduring restorative effect.

Stress-Reduction Theory (Ulrich, 1983)

In his psycho-evolutionary model, Ulrich postulates that exposure to natural settings enables restoration from stress. Environments representing characteristics that would enable a person to naturally survive, lead to physiological activity and positive affective responses. This reaction eventually causes stress reduction and aesthetic preference at the same time (Ulrich, 1983). The process is evolutionarily influenced and not necessarily conscious for the person perceiving the environment. The physiological and affective reaction can occur before the individual judgement of the scene has been made. Preference, stress reduction and positive affect are revealed by various components in natural environments, eliciting different mechanisms:

A moderate to high complexity leads to an accelerated recognition and identification.

A moderate to high level of depth or openness and a ground surface texture affords accuracy of depth estimates and leads to the comprehension of three-dimensional features, enabling orientation.

The absence of threat and tension is needed to avoid dislike and fear.

Deflected vistas are an important signal for new landscape information beyond visual bounds, leading to a cognitive process eliciting anticipation.

Water features evoke quick affective reactions and aesthetic pleasantness, interest and tranquillity, unless it is storming.

People prefer environmental scenes with these characteristics, followed by pleasurable feelings. A strong relationship between preferences, stress reduction and the effect on human well-being is postulated (Ulrich, 1983).

Integration of attention-fatigue approaches and stress approaches

There are, in fact, some parallels that can be used for an integrational framework (Kaplan, 1995). Both theories focus on restorative effects of natural environments. Interestingly, the stress-reducing effect of nature is complementary to that found in stress research: e.g. people with a high level of cortisol, an indicator for stress, tend to have more attention fatigue after a task session than those with a lower cortisol level (Bohnen, Houx, Nicolson & Jolles, 1990). It is suggested that stress reduction is first to develop, while restoration of attention fatigue develops subsequently (Hartig, Evans, Jamner, Davis & Garling, 2003).

3.4 Method

To obtain an overview of the research on environment and well-being, we first looked at review articles on links between environment and health published in recent years (Van den Berg, 2005; Van Kamp et al., 2003; Verheij, 1996; Kaplan, 1995; Tzoulas, Korpela, Venn, Yli-Pelkonen, Kazmierczak, Niemala et al., 2007; Matsuoka & Kaplan, 2008).

We then scanned recent publications in the databases ISI Web of Knowledge and PsychLit for peer-reviewed experimental studies, using key terms "natural environment", "psychological restoration", "well-being" and "restorative environment". As we discovered manifold research on these key terms, there was a need to narrow the scope of the research. We defined inclusion criteria based on content, methodological and technical considerations.

Content-related inclusion criteria

- Various studies focus on the effect of natural environments on restoration. Restoration as a precondition for well-being will be reported on. While several studies focus on individual assessment of physical environment, e.g. in preference studies (e.g. Sommer, 1997; Purcell, Peron & Berto, 2001), we exclude these, unless there is a link towards a direct effect on people.
- We are interested in the influence of environments in general and of specific forms of natural and urban environments that possibly effect human well-being in a particular way.
- The focus is on healthy adults. Studies on children or people suffering from diseases (e.g. Veitch, Bagley, Ball & Salmon, 2006) are excluded, as it is our aim to generalize results for the healthy adult population.

Methodological inclusion criteria

- Concerning well-being, we concentrate on self-reported measures, even though there are many studies using physiological measures (e.g. Van den Berg, Koole & Van der Wulp, 2003). Self-reported well-being is not entirely independent from physiological measures, but these cannot be used directly to measure it (Abele-Brehm & Brehm, 1986).
- As we are interested in public health, the main focus is on outdoor public areas. We exclude private living environments, because it is not possible to show clear causal effects due to self-selection mechanisms: healthy people tend to move and live in rather green areas (De Vries, Verheij, Groenewegen & Spreeuwenberg, 2003). Thus, epidemiological and survey studies are excluded.
- We concentrate on studies using experimental designs, integrating reference group conditions and random samples that exclude self-selection mechanisms. Experiments allow causal statements, because variables enabling alternative

explanations are controlled for. This decision enables us to focus on direct effects rather than on individual assessment of physical environments.

Technical inclusion criterion

- In addition to these choices, based on contents and methods, we selected peer-reviewed studies reported in English only.

All articles were critically scanned for natural environments influencing people's well-being and main aspects they identified. The review is structured according to the environments and the dependent variables connected to health.

The comparison of natural and urban environments and their effects on human health are discussed in sections 3.1 (restorative and affective measures), whereas section 3.2 faces the discrimination of the effect of different natural conditions and specific characteristics, again addressing both restoration and well-being.

3.5 Empirical state-of-the-art

Table 3.1 gives an overview of the relevant research, according to: (1) the kind of stimulation used, (2) the relevant measures concerning the dependent variables, e.g. the instrument to measure well-being, and (3) the sample size, type of participants and country of each study.

Table 3.1: Overview of research studies reported

Restoration effects of natural compared to urban environments			
	Kind of stimuli	Relevant measures	Sample size, type, Country
Laumann, Gärling & Stormark, 2001	<i>Study 1:</i> Imagining being in area <i>Study 2:</i> Video	Restorative components <i>Study 2 additionally:</i> Preferences Relaxation	238 157 Students Norway
Laumann, Gärling & Stormark, 2003	1 st relaxing 2 nd mental load 3 rd video-tour	Attention	28 Students
Berto, 2005	<i>Study 1 & 2:</i> 1 st attention task 2 nd 15 sec. photographs 3 rd attention task <i>Study 3:</i> self-paced condition	<i>Study 1 & 2:</i> PRS Attention <i>Study 3 additionally:</i> Time of looking at scene	32 32 32 Students Italy
Staats, Kieviet & Hartig, 2003	1 st Imagining being attention fatigued vs. fully refreshed 2 nd Walk-order slides	Preferences Attention recovery Reflection	101 Students Netherlands
Staats & Hartig, 2004	1 st inducing attention fatigue vs. no fatigue 2 nd imagining being alone vs. with a close friend 3 rd Set of slides	Recovery Reflection	106 Students Netherlands
Hartig & Staats, 2006	1 st inducing more vs. less fatigue 2 nd walk-order slides	Preferences Attention recovery Reflection	103 Students Sweden
Herzog, Black, Fountaine & Knotts, 1997	1 st inducing goals: attention restoration vs. thinking about task 2 nd colour slides	Recovery Reflection	187 Students USA

Restoration and well-being effects of natural compared to urban environments			
	Kind of stimuli	Relevant Measures	Sample Size, type, Country
Hartig, Mang & Evans, 1991	<i>Study 1:</i> Vacation <i>Study 2:</i> 1 st inducing cognitive fatigue 2 nd walking vs. relaxing	Pre-post-follow-up: ZIPERS OHS Cognitive performance Restorative aspects	68 Experienced backpackers 34 Students USA
Hartig, Korpela, Evans & Gärling, 1997	<i>Study 1:</i> Visit <i>Study 2:</i> Visit & video <i>Study 3:</i> Colour slides <i>Study 4:</i> Colour slides	PRS ZIPERS	39, USA 95, USA 75, Sweden 78, Finland Students
Ulrich, Simons, Losito, Fiorito, Miles & Zelson, 1991	1 st Stressful movie 2 nd video of setting	ZIPERS	120 Students USA
Van den Berg, Koole & van der Wulp, 2003	1 st frightening movie 2 nd video	Pre-post-Design: POMS; total happiness Overall level of stress Preference Concentration	114 Students Netherlands
Hartig, Evans, Jamner, Davis & Gärling, 2003	1 st inducing high vs. low restoration needs 2 nd walk	OHS during walk Pre-post-Design: ZIPERS Attention	112 Students USA
Bodin & Hartig, 2003	Occasion: first or second run	Pre-Post-Design: Self-report emotions Attention	12 Runners Sweden
Pretty, Peacock, Sellens & Griffin, 2005	Physical activity & slides	Pre-Post-Design: POMS Self-esteem General Health	100 Students, employees & local community UK

Restoration and well-being effects of different natural environments			
	Kind of stimuli	Relevant measures	Sample Size, type, Country
Herzog, Maguire & Nebel, 2003	Slides	PRS and Preference Restorative components openness, visual access, movement ease, setting care	512 Students USA
Herzog & Kutzli, 2002	Colour slides	Perceived danger Perceived fear Preference	438 Students USA
Lohr & Pearson-Mims, 2006	Black & white slides	Pre-during-post-Design: Aesthetic preference Affective response	206 Inhabitants near university USA
Han, 2007	Colour slides	<i>Study 1:</i> Scenic beauty Preference <i>Study 2:</i> PRS <i>Study 3:</i> Revised PRS	92 93 89 Students, USA
Tenngart Ivarsson & Hagerhall, 2008	Photographs	PRS Preference	74 Students Sweden
Gathright, Yamada & Morita, 2006	Climbing activity Tree and tower	Pre-during-post-design: POMS	11 Students & faculty members Japan
Staats, Gatersleben & Hartig, 1997	Walk-order slides	Pleasure Arousal Scenic quality	98 Random sample with hiking experience Netherlands
Cackowski & Nasar 2003	1 st stress induction 2 nd STAXI 3 rd roadside video 4 th STAXI	Pre-Post-Design: STAXI Frustration tolerance	106 Students USA

Note: Sample sizes given by number of analyzed data

OHS = Overall Happiness Scale (OHS, Campbell et al., 1976) including "happiness"

POMS = Personal Mood State Tests (McNair et al., 1992) including dimensions "tension-anxiety", "depression", "anger-hate", "vitality", "fatigue", "confusion"

PRS = Perceived Restorativeness Scale (Hartig et al., 1997) including "being away", "coherence" ("extent"), "compatibility" and "fascination"

STAXI = Spielberger State-Trait Anger Expression Inventory (Spielberger, 1996) including "anger", "frustration tolerance"

ZIPERS = Zuckerman Inventory of Personal Reactions (Zuckerman, 1977) including "fear arousal", "positive affect", "anger and aggression", "sadness", "attentiveness and concentration"

3.5.1 Comparing the effect of natural and urban environments

Studies focusing on human reactions to different environmental settings are dominated by research comparing natural and urban environments. Many studies used the environmental characteristics "being away", "fascination", "extent" and "compatibility" (Kaplan & Kaplan, 1989) to measure restorativeness, e.g. by the Perceived Restorativeness Scale PRS (Hartig et al., 1997). The PRS is a measure of restorative environments, operationalizing the four basic environmental characteristics (Kaplan & Kaplan, 1989) by different subscales to be rated on 5-point-scales. It has been shown to be a valid measure to distinguish restorative qualities of different physical environments (Hartig, 1997).

3.5.1.1 Effects on restorative measures

Ten studies compared the effect of urban and natural environments on restoration and preferences. Consistently, they reported the superiority of natural environments on attention, measured by cognitive tasks (Laumann et al., 2001; Berto, 2005) and the perceived likelihood of attention recovery, measured by self-reported assessment of the participants (Staats et al., 2003; Herzog et al., 1997; Tenngart Ivarsson & Hagerhall, 2008). Reflection was reported to be stronger in natural environments as well (Herzog et al., 1997; Staats et al., 2003; Staats & Hartig, 2004; Hartig & Staats, 2006).

This first section dealing with empirical studies on the comparison of natural and urban environments shows the positive influence of natural environments compared to urban environments on preference, attention recovery and perceived restorativeness consistently. Aside from the individual assessment of restorative qualities of physical environments, the effect of cognitive performance, measured by cognitive tests, has been shown to be better after perceiving natural environments.

Restoration seems to be closely connected to individual preferences, shown by high positive correlations (Laumann et al., 2001; Tenngart Ivarsson & Hagerhall, 2008), and natural environments are clearly assessed more positively than urban

environments, used as a measure for preference (Laumann et al., 2001; Staats et al., 2003; Hartig & Staats, 2006).

3.5.1.2 Effects on affective measures

Another area of research analyzes the influence of natural and urban environments on subjective well-being besides the cognitive aspects of restoration. Compared with the measure of perceived restoration, mostly comprised by PRS or similar tools based on the characteristics proposed by Kaplan & Kaplan (1989) measuring perceived restorativeness, the measures for affective states are rather various.

Seven studies using different research designs consistently report a more positive influence on well-being of natural compared to urban environments, measured by self-reported well-being scales, e.g. the overall happiness scale (OHS, Campbell, Converse & Rodgers, 1976), used in several studies (Hartig et al., 1991; Hartig et al., 2003), the Zuckerman Inventory of Personal Reactions (ZIPERS, Zuckerman, 1977), used additionally in some studies (Hartig et al., 1991; Hartig et al., 1997; Hartig & Staats, 2003; Ulrich et al., 1991), the Personal Mood State Test (POMS, McNair, 1992) used in other studies (Van den Berg et al., 2003; Pretty et al., 2005) and individual scales (Bodin & Hartig, 2003).

Five studies were designed in a pre-post setting assessing well-being at least twice: before and after the natural or urban treatment to measure changes. Consistently, the positive dimensions of well-being were shown to increase stronger after perceiving natural compared to urban environmental stimulation (Hartig et al., 1991; Bodin & Hartig, 2003; Hartig et al., 2003; Van den Berg et al., 2003; Pretty et al., 2005). Yet another study used a film as a stressor to evoke the need for restoration and measured the restorative effect of different environments showing a more positively toned state after watching natural compared to urban setting videos (Ulrich et al., 1991). Again, this study showed the more positive effect on well-being after perceiving natural environments. This indicates that the effect of natural environments was more positive for well-being than the effect of urban environments. The negative

dimensions of well-being did not show such a consistent picture, though. Some studies showed a decrease of "anger/aggression", "fear" (Ulrich et al., 1991) and "anxiety/depression" (Bodin & Hartig, 2003). Other studies did not show significant differences in negative mood dimensions between the urban and natural environmental conditions (Hartig et al., 1997), indicating that the connection between perceived restorativeness and a decrease of negative mood dimensions is not as strong as the connection between perceived restorativeness and the increase of positive mood dimensions.

Additionally, aside from the higher ratings on perceived restorativeness, the natural settings were rated as being more beautiful. The authors concluded that this preference for a natural environment arises from the improvement in positive affect and the marginal cognitive restoration (Van den Berg et al., 2003). A close relationship between perceived restorativeness and emotional state has been stated by high correlations (Hartig et al., 1997).

The influence of activity in natural and urban environments

Besides visual and auditory stimulation, some research designs integrate activity: six studies integrated physical activity in the treatment condition. However, the results were rather inconsistent. One study compared the effect of walking in different environments and "passive" relaxing after cognitive fatigue, showing a more positive affect on restoration in the activity condition (Hartig et al., 1997). Three studies had their participants walk through the environments, providing no activity condition (Hartig et al., 1997; Hartig et al., 2003), and two studies requested rather strong physical activity, which turned out to reduce "anxiety/depression" as well as "anger", while the effect on attention was inconsistent (Bodin & Hartig, 2003). One study showed the positive influence on "mood" of physical activity in the control group without any visual stimulation at all (Pretty et al., 2005), indicating the positive influence of movement itself. But still, pleasant scenes increased this effect and produced a significantly greater positive effect on "self-esteem" than in the

control-group without any environmental scenes. This result indicates a synergetic effect of exercise and pleasant urban and natural environment (Pretty et al., 2005).

Individual variable: the need for restoration

After these basic effects of natural vs. urban environments, restoration psychology tends to move forward and analyze individual variables, which have an impact on the restorative effect. The need for restoration has been focused on and showed a differentiated effect of natural environments on people, depending on the time of day. For example, after a day of work this need was stronger than after being fully refreshed. This lead to a selected analysis between different groups, considered by several recent studies. The participants were randomly assigned to either a more or less fatigued experimental group, induced by variation of time of the study (Hartig & Staats, 2006), by the instruction to imagine being fatigued or not (Staats & Hartig, 2004) or by having half of the participants perform cognitive tasks before the stimulus presentation (Staats et al., 2003). Consistently, these studies showed a stronger increase of restoration in the more fatigued groups.

3.5.2 Comparing the effect of different natural environments

In this second part of the review, we focus on the influence of physical characteristics of different natural environments, presenting the results of ten relevant experimental studies.

The first study in this section focused on the comparison of natural and urban environments including the effect of "sports/entertainment" scenes (Herzog et al., 1997). Presenting colour slides, the expected superiority of natural compared to urban scenes in cognitive restoration and reflection was reported. Interestingly, cognitive restoration was still possible in the "sports/entertainment" scenes, but reflection appeared when looking at the natural slides only (Herzog et al., 1997). The authors explained this due to different reactions to the pictures, which may induce "hard" or "soft" fascination (Kaplan, 1995). The "sports/entertainment" scenes tended to give rise to "hard fascination", leading to cognitive restoration, while the

natural context induced "soft fascination", leading to cognitive restoration as well as reflection. The authors concluded that the overall restorative effectiveness in natural scenes is so remarkably high because cognitive restoration is accompanied by aesthetic pleasure, providing the opportunity for reflection about personal issues (Herzog et al., 1997).

Another study was concerned mainly with the analysis of the comparison of natural vs. urban environments and thus reported on in section 3.1.1 already. However, in their setting, they presented five different environments: forest, park, sea area, city and snowy mountain (Laumann et al., 2001). While the authors concentrated on the comparison of natural and urban environments, there was some evidence that different natural environments affect humans differently, because there was a variation in ratings of perceived restoration: the mean values for "escape" and "fascination" were especially high in the forest, while those for "novelty" and "extent" were highest in the mountains. Interestingly, the mean ratings of restorative characteristics for park were very low. These results indicate that there are differences in the level of restoration provided by different natural environments (Laumann et al., 2001), but further analysis and evidence is needed.

Three studies were concerned with perceived restorativeness and preferences at the same time, when focusing on different natural environments (Herzog et al., 2003; Han, 2007; Tenngart Ivarsson & Hagerhall, 2008), and two studies integrated affective outputs in addition to preferences, such as perceived danger and fear (Herzog & Kutzli, 2002), and positive and negative emotions (Lohr & Pearson-Mims, 2006). Results indicate that besides the characteristics Kaplan and Kaplan (1989) postulated, features such as "open views", "smooth ground surfaces" and "signs of setting care" positively influence the restorative effect of natural environments (Herzog et al., 2003). The analysis of natural field and forest settings showed that well-being is most positively influenced by "smooth, well-maintained ground surfaces", as well as "limbed up trees and shrubs", which did not impede

visibility or movement (Herzog & Kutzli, 2002), indicated by low values in perceived danger and fear. These results strongly support the theoretical framework of Stress Reduction Theory (Ulrich, 1983).

Another interesting approach analyzed the influence of tree shapes, showing that well-being was influenced differently depending on the tree characteristics. Not only that looking at black-and-white slides of trees was leading to higher positive and lower negative well-being outputs than inanimate objects, but "happiness" and "being pleased" were highest after looking at spreading trees, followed by rounded and conical trees (Lohr & Pearson-Mims, 2006).

Another study pointing out to the different output of natural areas is carried out by Han (2007), who compared the assessment of the six major terrestrial biomes, namely desert, tundra, grassland, coniferous forest, deciduous forest and tropical forest. Scenic beauty, preference and restorativeness for tundra and coniferous forests were most preferred by American students, while desert and grassland were least favoured. Interestingly, the perceived physical features "complexity", "openness" and "water features" (Ulrich, 1983) explained more variance than the terrestrial biomes. Han found a high "complexity" and "water features" to be most favourable for the participants.

There were studies focusing on different natural conditions, which included affective outputs. A variation of "vegetation density" and "accessibility" of forest landscapes revealed that low accessibility and high density positively influenced "arousal" and negatively affected "pleasure". The effect of accessibility was greater than that of density (Staats et al., 1997).

A driving simulation experiment using stress induction before showing roadside videos of either a built-up highway, a garden highway or a scenic parkway with varying amounts of natural green areas showed that "anger" did not vary between the groups, but the "frustration tolerance" was much higher with the parkway treatment than in the other treatments (Cackowski & Nasar, 2003).

All studies focusing on the effect of different environments reported so far worked with slides only, either with coloured or with black-and-white ones. Auditory stimuli and physical activation of participants were not included in the experimental designs.

The influence of physical activity in different natural environments

The next two experimental studies took activation into account additionally. Focusing on well-being effects of different natural environments, Hartig et al. (1991) compared well-being outputs of wilderness and non-wilderness backpackers in a quasi-experimental design, with a control group which had no vacation. Participants showed higher ratings on self-reported "happiness" scales in the wilderness treatment, but they were slightly depressed directly after the trip. The authors explain this due to readapting to the noisy and polluted environment of everyday life. Nevertheless the long-term effect of wilderness stays was positive concerning all "mood" dimensions. This exploratory study suggested that the effect of wild natural environments is more positive than less wild natural environments (Hartig et al., 1991).

Gathright and colleagues (Gathright et al., 2006) were interested in the influence of climbing on people's well-being. They varied tower climbing and tree climbing and measured physiological and psychological indicators before, during and after climbing. Their results indicate that the tree climbers showed higher "vitality", and at the same time less "tension", "confusion" and "fatigue" than climbers in the tower climbing condition (Gathright et al., 2006). Their sample size of eleven was, however, small, and replication is needed if results aim to be generalized.

3.6 Discussion

We reviewed research concerned with environmental influences on human health, represented by restoration and well-being effects. The scope of the review was purposely held quite narrow, addressing experimental studies only, and concentrating

on the dependent variables restoration and well-being. This narrow scope put us into the position to compare results and discuss the directly measured effects of environments on people.

In general, the empirical studies are strongly influenced by the restorative effect of the components "being away", "fascination", "extent" and "compatibility" (Kaplan & Kaplan, 1989) and the features "moderate complexity" and "homogenous ground surface texture" and "presence of water" (Ulrich, 1983). In this review we were less concerned with the assessment of these features than with the direct effect of the environment on the person perceiving it, which was associated with human restoration and well-being.

Following the structure of the review, we were concerned with two main questions, discussed one after the other.

What influence do urban and natural environments have on psychological well-being?

The first part of the review dealt with the influence of natural and urban environments on people. A long tradition of research showed the superiority of natural compared to urban environments, and a broad empirical base was found (Van Kamp et al., 2003; Van den Berg, 2005; Velarde et al., 2007). The impact of natural compared to urban environments has been shown on different output variables, which are described in the next sections.

Restoration

The restorative effect of environments has been measured in different ways. The measures can be classified in two main categories:

- Objective measures were used in six studies, e.g. by attention or concentration tasks after the presentation of the environments. The effects did not have to be conscious to the perceiving person.
- Other studies used subjective measures to predict cognitive performance, e.g. the individual assessment of the likelihood of attention recovery in four studies or perceived restoration in five studies.

Cognitive performance

Studies indicate that people performed consistently better in cognitive tasks after being exposed to natural scenes than after being exposed to urban scenes: natural environments helped people to regain their attention capacity far better than urban settings.

Perceived restoration

Another effect distinguishing between natural and urban environments shown is the perceived restoration, based on the restorative characteristics (Kaplan & Kaplan, 1989). Perceived restoration has been shown consistently stronger in natural compared to urban environments. Often, it was measured by the PRS (Hartig et al., 1997) or modified versions of PRS – short versions and translated versions according to the country – which have been well tested for scale qualities (Han, 2007). Some studies used similar scales constructed by the authors (Hartig et al., 1991; Laumann et al., 2001), based on the restorative characteristics (Kaplan & Kaplan, 1989) as well. These instruments assessed the perceived restorative qualities of the environments rather than a direct effect on restoration. However, perceived restoration has been shown a valuable predictor of restoration (Hartig et al., 1991).

Preferences

Besides restoration and well-being effects, a lot of empirical work integrates the individual assessment of the scenes, predicting preferences. High correlations between perceived restorativeness and individual preferences (Hartig et al., 1991; Laumann et al., 2001; Herzog et al., 2003; Tenngart Ivarsson & Hagerhall, 2008) implied that there is a close relation between restorativeness and preferences as Ulrich (1983) and Kaplan & Kaplan (1989) suggested in their theoretical approaches. However, we have to consider the measures: if perceived restoration and preference are assessed individually, they might be biased by the personal attitudes of the persons towards different environments (Kellert & Wilson, 1993), e.g. if a person expects the results of the study to influence design processes of environment, he would rate the preferred environment as being more restorative, too. This bias is less

possible if we look at cognitive performance, measured by objective tasks or standardized instruments, which are more robust to biases than the individual assessment of environments.

Individual variables affecting restoration

The recent trend of research seems to orient towards the distinguishing between different person-related variables, especially the individual need for restoration. While the superiority of natural environments for cognitive restoration applied to all participants, the effect was larger for mentally fatigued persons than for not fatigued persons. This result is seminal when focusing on different user groups, e.g. the restorative potential for people with health complaints or planning therapeutic environments (Gesler, 2005; Korpela & Ylen, 2007).

Affective component

The second main output variable we focused on is the affective component being influenced by physical environment. The affective component has been measured by different instruments of well-being.

Well-being

Concerning the dependent variable of well-being, we discovered that it was more positively influenced by natural than by urban environments. This was especially true for the positive scales, while the negative scales of well-being (e.g. "anger") showed a less consistent picture when comparing different environments: comparing the effects of natural and urban environments, there was a stronger increase in "positive well-being" and a stronger decrease in "anger" and "fear" in natural compared to urban environments, while "negative affect" did not differ between the natural and urban environments (Hartig et al., 1991; Ulrich et al., 1991; Hartig et al., 1997).

Well-being measures do not show such an overlap between different studies as restoration measures do. Different measures were used by different studies, hence the possibility to compare results needs to be questioned. However, positively enough,

we discovered that most studies (eight out of eleven) used standardized measures based on a common construct of well-being. While the expressions of the scales differ between the measures, they all adapted from a common model consisting of a general activation component (tension vs. relaxation) and an affective component (positive vs. negative evaluation of the own situation). Thus, the comparison of results is possible to some degree, when looking at the differentiated dimensions of well-being. These were compared in the review and showed a high consistency over the studies, all indicating a stronger increase on the positive dimensions in natural than in urban environments. The impact on negative dimensions was less obvious and needs to be focused on in further research.

Interestingly, when studying the effects on psychological well-being, most studies used pre-post-designs. These enable the measurement of individual baselines of well-being, which can differ strongly. After the environmental treatment, the post measure enables to calculate actual changes of well-being. This empirical setting allows the measurement of effects rather than individual assessments. Pre-post-designs need to be faced in the future, too, if causal effects are to be measured.

Are natural and urban environments extreme poles in their effect on humans?

A critical and provocative question arising is whether studies purposely selected contrasting environments to show significant effects. So far, urban environments have probably been selected to contrast to natural environments, not representing restorative potential. This is a good point to start with. But, as we see, we need to go further and distinguish between different natural environments as well as between different urban environments concerning their effects on restoration and well-being.

As we have reviewed, natural environments have a significantly stronger positive effect on cognitive performance, perceived restoration and well-being than urban environments. When looking at more than two contrasting scenes (natural vs. urban), the natural still seems to have the most positive impact on people, followed by a second sort such as "sports/entertainment" scenes (Herzog et al., 1997) or even

simple geometrical forms (Berto, 2005). The lowest restorative potential was found in urban environments in these studies.

A possible explanation for the superiority of natural environments compared to urban environments in terms of restoration and well-being might be that natural and urban environments represent extreme poles on a continuum of environmental restorativeness. However, this explanation is not very far-reaching, when looking at recent research, diversifying the impact of different urban environments (Hagerhall, Laike, Taylor, Kuller, Kuller & Martin, 2008). Concerning the question, whether natural and urban environments represent extreme poles between more and less restorative effects, we cannot give an answer yet. Diversified environments of either natural or urban scenes need to be focused on to analyze this question. On the one hand, the restorative potential of urban environments needs to be examined in further research. Positive effects of urban environments are recently analyzed, but so far, no experimental studies in the scope of our review can be reported on.

However, on the other hand, there is some empirical research on the differences concerning the impact of various natural environments, which leads us to the second main question of the review, showing the comparison of different natural environments.

What influence do different natural conditions have on psychological well-being?

As we have shown, we cannot assume that all natural environments contribute to restoration and well-being in the same way. Thus, we analyzed studies focusing the effects differentiating natural environments. Interestingly, the research on different natural environments supporting human restoration and well-being is not quite as rich as that comparing urban and natural environments. One basic remark concerning this imbalance might be a publication bias: if we consider the natural and urban environments as contrasting, the effects in between these groups are expected to be much smaller. With limited sample sizes – often less than 100 participants – , which were used in the studies reported on in superior number, it might be difficult to find significant results, which could easily be published.

However, a positive impact of mixed natural and built environments has been shown (Tenngart Ivarsson & Hagerhall, 2008), indicating that the results cannot be reduced to the natural-urban dichotomy. Some studies were concerned with causal effects of different natural environments towards restoration and well-being, even though the results were at times quite singular and difficult to compare.

An initiative approach showed that forest and mountain areas do have different restorative potential, indicating that there are differences in their impact. Parks were assessed very low concerning restorative components, suggesting a lower restorative potential than other natural areas (Laumann et al., 2001).

Wild natural areas seem to affect people more positively in the long term than well-kept areas (Hartig et al., 1991), which needs to be proved by further research in longitudinal studies. The immediate effect of wild and tended was rather inconsistent. An immediate positive effect on well-being was found in either rather maintained nature settings (Staats et al., 1997), or rather unmaintained areas, represented by high complexity (Staats et al., 1997).

Empirical work showed restorative characteristics (Kaplan & Kaplan, 1989) to be positive for human well-being. However, precise characteristics like "open views", "accessibility" and "setting care", as well as "visibility" and "locomotor access", have been analyzed and effect well-being positively, too (Herzog & Kutzli, 2002; Herzog et al., 2003). The relation between these characteristics to the restorative components (Kaplan & Kaplan, 1989) or stress-reducing features (Ulrich, 1983) has not yet been in focus.

Other positive factors, which have been shown to be restorative, are spreading tree shapes (Lohr & Pearson-Mims, 2006), a high "complexity" and the "presence of water" (Han, 2007). These findings are consistent with the stress-reducing components, leading to positive affect (Ulrich, 1983).

Negative impacts of natural environments are shown by less maintenance like "high visual obstruction" and "poorly maintained ground surfaces" regarding well-being (Herzog et al., 2003).

Thus, it seems that specific characteristics of the natural environment are responsible for restorative experiences and the effect on well-being. The results of the review showed that even in natural environments, there are no uniform influence factors: we have to distinguish between different characteristics that have positive and negative effects. These characteristics should be considered in developing processes of natural areas supporting human health.

How can we classify these diverse approaches to characterizing natural environment? One approach facing this aspect is by Natori and Chenoweth (2008), who suggested to distinguish topography (sloped vs. flat) and appearance (traditional vs. contemporary vs. abandoned). Approaches like that are needed in order to further analyze environmental characteristics and their effect on restoration and well-being.

Interrelations between the different concepts

In addition to well-being, various studies measured cognitive restoration and showed positive correlations between both concepts (e.g. Hartig et al., 1991), the interrelation seems to be as strong as suggested by the theoretical approaches (Ulrich, 1983; Kaplan, 1995; Hartig et al., 2003).

There is another concept, which has been reported on and which we want to point out. While this review excludes preference studies, which are not concerned with specific effects of environments, we discovered some overlaps between direct outcomes and preferences.

Restoration and preference

Interestingly, almost half of the experimental studies reporting on cognitive outcomes after presenting different physical environments measured preferences, too. Correlations between restoration and preference are reported consistently high over the studies (e.g. Laumann et al., 2001; Berto, 2005).

Well-being and preference

For well-being, the affective component after presenting different physical environments, five out of eight studies measured preferences, too. This is consistent

with Ulrich (1983), who stated preference follows the affective response of a person. The results consistently report positive relations, mostly shown by high correlations (e.g. Hartig et al., 1997; Van den Berg et al., 2003).

A close relationship between preference and affective response (Ulrich, 1983) and restoration (Staats et al., 1997) appears to be very likely, shown by high correlations, but it has not been focused on systematically yet. Preference studies, which offer a rich base of empirical work, provide the opportunity to differentiate between different environments. Even though preference studies are usually not experimental, and thus excluded in this review, they need to be focused on in future, because their strength lies in the analysis of different environments in detail, opening up the urban-natural dichotomy, which has dominated the experimental studies. High correlations have yet shown the close relationship between well-being, restoration and preferences, thus preference studies can help us to move a step further in analyzing effects of different natural and different urban environments.

Methodological Remarks

The scope of the review was narrow due to strict inclusion criteria. This allowed us to discuss the comparison between the results of the different experimental studies and analyze them in a more detailed degree. However, we want to point out some methodological considerations of the experimental research in the field of restoration and well-being in natural environments, which was focused in this review.

Presentation mode of the stimulus material

The environments used as independent variables in the experimental studies reported on have been carefully selected. However, the presentation modes vary from imagining the given scene (verbal description), visual stimulation (photographic slides), visual and auditory (video simulation) to a holistic sensation of the whole scene, addressing all senses (real exposure). Few studies integrate activation, which creates a rather complex setting. These need to be systematically integrated in future research to find out whether the results are comparable or not.

The presentation modes of the environmental stimulations were shown to be very diverse between the different studies. With a few exceptions (Pretty et al., 2005; Hartig & Staats, 2006), different stimulations were used for different environmental settings. We need to question if the presentation mode itself has an impact on the dependent variables, e.g. restoration (Bishop, 1992; Daniel, 2001; Bishop & Rohrmann, 2003). Future research should take this into account, integrating research designs comparing the same environmental stimulation presented by different presentation modes.

Samples of the experimental designs

There are some remarks we want to make regarding the used samples of the reported experiments, basically concerning two considerations: the size and the composition of the samples.

Concerning the size of the samples, some of the research we looked at is rather explorative and included few participants. Half of the studies used samples with fewer than 100 participants, thus some effects might not get visible due to small effect sizes. A generalization of the results is questionable.

Concerning the composition of the samples, we see that the participants might give another limitation concerned with the generalization of the results. Most studies consisted of student samples exclusively. These give valuable findings about the effect of natural environments on human well-being, but generalizing from these findings to other age groups is problematic (Zube, Pitt & Evans, 1983). Only six studies included other participants, one study used a representative sample (Staats et al., 1997).

Different user groups should be faced in future research, e.g. natural environments seem to be especially important for women, people from low-income households and the elderly (e.g. De Vries, 2003; Scopelliti & Guiliani, 2004) and people with health problems (Korpela & Ylen, 2007). Experimental research needs to include these groups in future research instead of limiting results to student samples.

The approach to measure causal effects of environments by experimental designs has been shown to give valuable results, and we strongly encourage continuing with empirical work in this tradition, integrating larger, open to non-student samples and integrating the results arising from preference studies.

3.7 Conclusion

Existing experimental work clearly shows that exogenous attributes have a strong impact on people's well-being. This review shows that natural environments have a positive influence on people's well-being in terms of affective and cognitive processes in comparison to urban environments. Moreover, "signs of setting care", but also "high complexity" in natural environments seem to intensify this positive effect. Such findings need to be investigated systematically in future research, integrating the rich empirical base of preference studies. While this review is concerned with causal effects, namely restoration and well-being, preference studies could be important in the future, because they focus different kinds of environments, going further than distinguishing between natural and urban environments. As Kaplan and Kaplan (1989; p. 189) already proposed that "a preferred environment is more likely to be a restorative environment", these studies need to be focused on in the future, linking them to the measurable effects of environmental stimulation.

In order to plan natural environments, we need to compare different natural environments, varying with respect to the appearance of the environment (e.g. sloped or flat; wild or tended) and its form (park, mountain, forest). Not only do natural environments need to be analyzed in detail, but the aspects of urban environments need to be looked at in the future as well. Different natural or urban conditions need to be defined precisely in an interdisciplinary context. It would be helpful to have a classification of different natural environments, e.g. is a natural area with well-

maintained ground surfaces more conducive to health and well-being than wild natural areas?

Results would serve for guidelines on designing natural areas promoting public health. We will have to explore the implications of these differences and the possible consequences for environmental effects. Aside from the positive effects, negative effects arising by physical environments, such as noise or arousing fear, need to be considered in future research and planning processes as well (Milligan & Bingley, 2007). Once the effects of specific characteristics in natural environments have been identified, we will be able to incorporate them in planning and developing natural areas to promote psychological well-being as one aspect of public health.

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4 Visiting Urban Forests – Analysing Mental Processes Causing Well-being

4.1 Abstract

Various studies have demonstrated the effect of physical environments on human well-being. This study examines the impact of different natural environments on human well-being from the perspective of users. Qualitative interviews were conducted to explore user perspectives on the relationship between different forms of natural environments and effects on human well-being. Individual mental models were reconstructed. Findings from these individual models were analysed and developed into a general model, which served to generalize hypotheses. A subsequent quantitative experiment was carried out with a sample of visitors to natural areas (N = 96) to test the hypotheses. Interviews highlighted different well-being aspects. "Usefulness", and "the contrast to daily life", as well as "the focus of mind" which included "drifting away from daily tasks and hassles" were reported to be important factors influencing positive well-being. Qualitative findings were supported in the quantitative experiment, enabling generalization and an active contribution to the management of natural areas supporting human health and well-being.

4.2 Introduction

Due to the increasing number of people living in urban areas, cities are becoming more densely populated (Wolfslehner & Vacic, 20089. In Switzerland, the amount of settlement areas increases by 0.9 square meters per second by new buildings. These

trends lead to increasing mental fatigue in urban-based individuals, and the need for alternative approaches to restore human well-being. Natural environments close to people's living and working surroundings are increasingly important for urbanized societies (Chiesura, 2004). Urban areas are known to increase mental fatigue, thus leading to a need for restoration, whereas natural environments provide restoration and health (Hartig, 2007). A high demand for nature-based recreation for the general public is observed (Shrestha, Stein & Clark, 2007), indicating the importance of planning natural places as a source for restoration in urban surroundings. Urban inhabitants have more contact with natural environments, if these are close by: access to close-by nature leads to more frequent and longer stays and experiences including the engaging of physical activity (De Vries, 2003). This opens up the opportunity for natural areas in urban environments to support restoration processes, namely improving cognitive attention and affective well-being (Ulrich, 1983; Hartig et al., 1997). The positive effect of natural environments compared to urban environments has been supported empirically (e.g. Hartig, Mang & Evans, 1991; Laumann, Garling & Stormark, 2003; Staats, Kiviet & Hartig, 2003). Experiences in natural compared to urban environments are consistently reported as preferred for restoration and well-being, which are shown to be closely connected (Ulrich, Simons, Losito, Fiorito, Miles & Zelson, 1991; Herzog, Maguire & Nebel, 2003; Staats, Kiviet & Hartig, 2003; Van den Berg, Koole & Van der Wulp, 2003; Berto, 2005; Hartig & Staats, 2006).

An analysis of processes initiated by different environmental conditions is a step towards better integration of health promoting natural areas in urban contexts. Some research has focused on the effect of different levels of "wildness" in natural areas, such as more or less wild natural environments in vacation settings. Explorative research indicates that wild natural environments have a more positive effect than less wild areas on human well-being (Kaplan & Frey Talbot, 1983; Hartig et al., 1991). Studies by Han show a preference for tundra and coniferous forests compared to desert and grassland (Han, 2007). These results focus on the characteristics of environments, whereas studies explaining the activation of internal processes, which actually arise in specific physical environments, are limited. Several studies have

described the effect of natural features on stress reducing and restorative outcomes (for an overview see Chapter 3 or Van den Berg, 2005; Velarde, Fry & Tveit, 2007). However, the specific mental processes activated still need to be analyzed in detail (Hartig, 2007).

In this study we explore these processes, including the theoretical background of Attention Restoration Theory (Kaplan & Kaplan, 1989) and Psycho-Evolutionary Theory (Ulrich, 1983). Additionally, we integrated the concept of well-being, including mental models of the public towards the topic. We focus on affective processes involved in the perception and specific effects of environments. Processes affecting well-being, regarded as a combination of physical and mental health, are analyzed (Verheij, 1996). This study distinguishes between different natural conditions, assuming they initiate different processes in the person perceiving it.

In order to analyze the internal processes leading to restoration we examine different kinds of nature, namely forest and open land, as well as different conditions of natural environments, namely wild and tended areas. Whilst Kaplan and Ulrich have developed a strong empirical base, we open up this perspective by analyzing perspectives of public. New perspectives and processes about the influence of natural environments on human well-being will be explored.

Our research question arises out of the resumed considerations:

What kind of cognitive and affective processes influencing well-being are initiated by different natural environments – wild and tended forest and open land in particular?

Empirical approach: Two studies addressing research question

To answer our research question, we chose an approach consisting of two subsequent empirical parts. Study 1 explores people's knowledge and subjective ideas about the specific influences of natural features on human well-being: individual mental models focus on the natural environments in general, and specifically on wild and tended forest and open land. Analyzing the perceived relationships, we generated hypotheses and tested them in an experimental design in Study 2. This focuses on testing the qualitative model, a comparison between forest and open land has not

been topic of the quantitative study yet. Both methods are described in detail in the following two sections.

4.3 Study 1: Qualitative Method

Ideas about cognitive and affective processes influencing well-being shall be explored by opening up the perspective of theoretical considerations towards the integration of lay peoples' perspectives. Mental models concerning relationships between natural environments and human well-being were collected. Mental models represent the complex knowledge a person has available about a specific topic (Flick, 1999). They describe individual assumptions of a person about the relations in daily life. They serve to orient in a complex environment, and influence individual behaviour (Faltermaier, 2002). People's assumptions about causes and relationships include explicit and implicit assumptions.

To identify these assumptions and reconstruct mental models relating to the natural environment and health, we conducted semi-standardized interviews (Witzel, 1985), providing the opportunity to elicit a broad variety of perspectives towards the topic, including new aspects, thoughts and interrelations (Flick, 1999). To illustrate the four conditions of nature – wild and tended, forested and open – four photos were used (Figure 4.1). The pictures were used for demonstration purposes only; they do not claim authenticity. During the interview, the photos could be referred to for clarification or to return to the topic.



Figure 4.1: Illustration of natural conditions: wild forest and open land, tended open land and forest

4.3.1 Procedure

Semi-standardized interviews consisted of three sequential question types, focusing on different levels of information (Witzel, 1985). The three question types included:

1. The interviews started with *open questions*, allowing the interviewee to spontaneously mention explicit assumptions about the topic. This allowed the researcher to integrate different content areas and exclude possible hypotheses of the researcher. In this study an open question was asked for each content-related topic (example for questions see figure 4.2).
2. The second part of the interviews consisted of *theoretical hypotheses-orientated questions*, based on the literature. This study focused on three theoretical topics: attention restoration (Kaplan & Kaplan, 1989, Hartig et al., 1991), congruence approaches (Carp, 1984) and control approaches (Fischer & Stephan, 1990). Interrelations formulated in these theoretical approaches were given in the questions in order to elicit ideas, which are not explicitly present to the interviewee in the first place. These interrelations offered opportunities to either negotiate or agree with the statement, depending on the personal mental model.
3. To elicit implicit ideas, *confrontational questions* (Flick, 1999) were asked, serving to critically question contradictory statements within the interview. The interview guidelines included a variety of contradictory alternatives of the mentioned theories. Thereby, the interviewee cannot just integrate the new new statement into his or her own theory.

After transcribing and analyzing each interview globally (Böhm, Legewie & Muhr, 1992) and carrying out a qualitative content analysis (Mayring, 2003), core

statements from each interview were written and visualized on cards (figure 4.2), and used for the forth subsequent phase with interviewees.

4. A second session with interviewees aimed to validate contents and interrelations in the individual mental models by communicative validation of the contents and interrelationships in the models (Flick, Von Kardoff, Keupp, Von Rosenstiel & Wolf, 1991). After the first interview, the researcher maps a model including concepts and interrelations the interviewee mentioned on a set of cards with central statements from the interview. In a second session, approximately 1-2 weeks after the first interview (Flick, 1999), the rules of the technique of reproducing mental structures ("*Strukturlegetechnik*"; Scheele & Groeben) were explained to the interviewees. Using the cards with statements, the interviewee had the opportunity to build up his own model and show interrelations between the different concepts, complete statements and answer questions. Thus, we developed 7 individual models in cooperation with the expert interviewees.

Each interview session was transcribed and the context was journalised. By qualitative content analysis (Mayring, 2003), relevant categories to the research topic were extracted from each interview. An individual mental model was reconstructed for each interviewee, including the second session which aimed to reconstruct mental structures by visualizing them on cards.

After the individual models were visually put up, the structure was subsumed into one general model, including the different aspects of the individual models.



Step	Question Type	Aim	Example
1	Open Questions	Explicit Assumptions	"How is natural environment influencing your mood?"
2	Theoretical Questions	Not explicitly present ideas (hypotheses-orientated)	"For some people it is important to gain orientation in nature, others enjoy nature, where it is hard to gain orientation. What do you think is influencing your well-being?"
3	Confrontational Questions	Critical questioning of contradictory statments	"You mentioned that you enjoy a change of location compared to work. That is the case in your apartment, too. What is the difference?"
4	Global Analysis	Transcription Qualitative Content Analysis	
5	"Strukturlegetechnik"	Communicative validation	

Figure 4.2: Overview of the qualitative procedure in five subsequent steps

4.3.2 Sample

We expected a wide variety of perspectives on the research topic. Thus, the interviewees were selected by theoretical sampling (Glaser & Strauss, 1967) a stepwise procedure carried out parallel to the interviews. To select interviewees we looked for maximum contrasts on four dimensions (Figure 4.3) and stopped as soon as theoretical saturation was reached, namely when no more new informants were seen to contribute anything of significance to the research question (Glaser &

Strauss, 1967; Hunziker, 1995). This led us to interview 15 people living in Switzerland, aged 26 to 71 (Table 4.1).

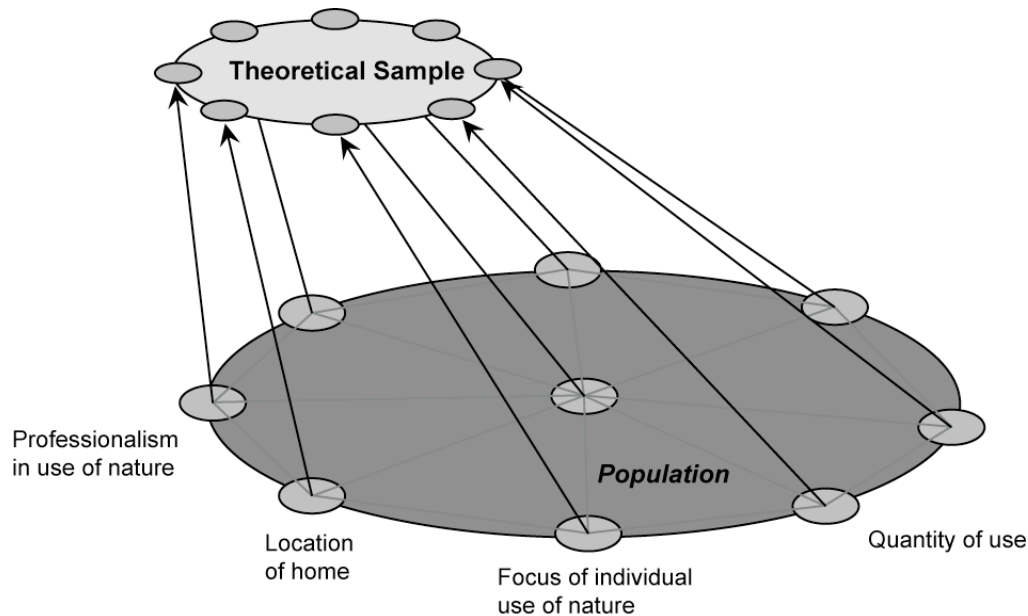


Figure 4.3: Principle of theoretical sampling, based on Glaser & Strauss, 1967, figure adapted from Hunziker, 1995

To obtain a broad variety of perspectives, we chose the following contrasting dimensions:

1. *Professionalism in using nature:* Lay people and experts
2. *Focus of individual use of nature:* Economic and leisure foci
3. *Location of home:* Rural and urban settings
4. *Frequency of use:* Frequent and rare use of nature

The procedure of "Strukturlegetechnik" is very ambitious. It requires people to put terms and definitions in formal relationships, which can lead to irritations. Thus, we adapted the procedure to suit interviewees, as advised (Flick, 1999) and limited the second session to experts, who are involved professionally in natural topics, including natural environments, thus were more likely able to articulate formal relationships of nature and well-being.

Table 4.1: Interviewed persons; theoretical contrast dimensions in 1st to 5th column

No.	Professionalism concerning nature E = Expert L = Lay person	Focus individual use of nature	Location of home	Work time in nature hrs per week	Leisure time in nature hrs per week	Age	Sex
01	E: Employee WWF	Leisure	City	-	8	41	M
02	L: Cook	Leisure	City	-	0.25	35	M
03	E: Federal Office Forest & Landscape	Economic	Rural	-	4.5	45	F
04	L: Member of alp-club	Leisure	City	-	7.5	45	F
05	E: Garden planner of scenic urban parks	Economic	City	20	8	49	F
06	E: Forester	Economic	Rural	4	6	44	M
07	L: Lawyer	Leisure	City	-	4.5	26	F
08	E: Leader of forest project	Economic	City	-	4	27	M
09	L: Farmer, retiree	Economic	Rural	40	14	69	M
10	E: Farmer	Economic	Rural	40	9	52	F
11	E: Member of forestry association	Economic	Rural	22	8	45	M
12	E: Employee Greenpeace	Leisure	City	-	6	46	M
13	L: Pensioner	Leisure	Rural		9	71	M
14	L: Bank clerk	Leisure	Rural	-	10	36	F
15	L: Pensioner	Leisure	Rural	-	6	64	F

4.3.3 Qualitative Results

The results were structured according to the qualitative categories derived from the interviews. The general influence model derived from the interviews is introduced first, followed by citation to illustrate each component of the model. After describing the content of each category, the qualitative result relating to each category is explained. In general, all interviewees had sophisticated ideas about the influence of nature on their individual well-being. Some used this individual knowledge intentionally to support their well-being in specific situations, e.g. after a hard day at work or an argument. The 15 individual models merged in a general model, shown in figure 4.4. The four general categories will be described in detail, integrating different individual aspects from all interviewees.

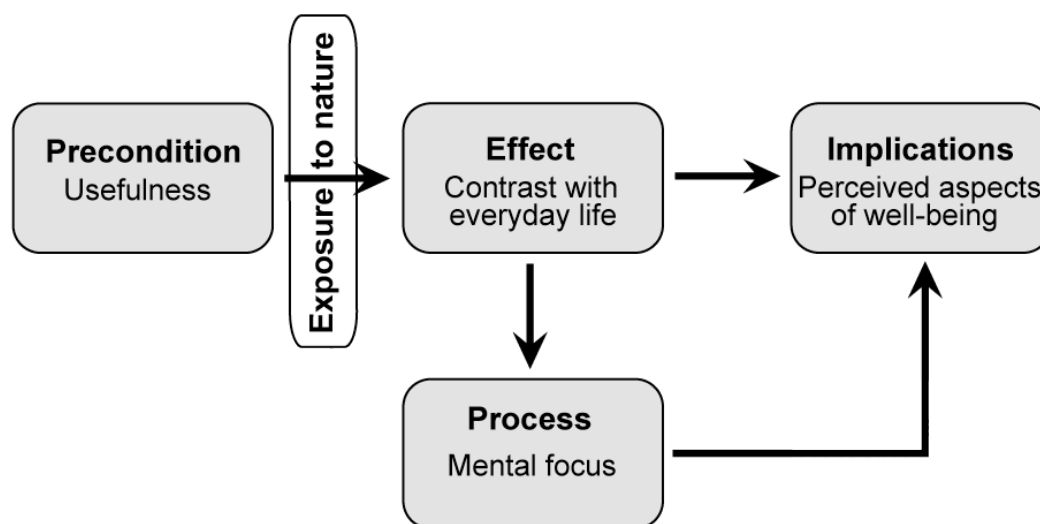


Figure 4.4: General influence model of natural environments affecting human well-being
(own model)

The qualitative categories identified by interviewees as contributing to human well-being will be presented. Merging into a general model including all 15 interviews, we identified four main topics leading to an impact of physical environment on well-being (figure 4.4).

1. Usefulness served as a precondition, allowing a stay in natural environments. 2. The effect arising directly from the presence in natural environments is a contrast with everyday life, which allows 3. the mental focus to change and 4. eventually arouses well-being aspects in the natural visitor.

Within these categories, we provide new statements and possible connections relating to psychological processes arising from contact with natural environments. Individual statements and models do not aim to quantify statements, thus we report citations mentioned by several interviewees as well as those mentioned by only one interviewee.

4.3.3.1 Precondition for Well-being: Usefulness of Natural Areas

According to interviewees, an important precondition for a positive impact of a natural area on human well-being is its "*usefulness*". This category is divided into "*accessibility*" to nature and "*opportunities for acting*" with nature. According to interviewees the most important factor for a positive impact on well-being is the "*accessibility*" of the natural area, especially in an everyday context.

Interviewees suggested "*accessibility*" is closely related with the condition of "*wild*" or "*tended*" natural areas, indicating "*wild*" natural environment are less accessible for the public. Daily opportunities for a contact with natural environments is more likely in "*tended*" natural areas, assumingly everyday well-being gets influenced by "*tended*" natural areas more positively. For individuals with more time "*wild*" natural environments influence well-being more positively.

In relation to daily well-being one interview partner mentioned accessibility as the main criterion:

"These are strong pragmatic factors that influence the decision. I have three children, and certainly we usually go somewhere as close as possible."
(Interview 1)

In contrast, having more time available means that – once in "*wild*" and less accessible natural environments, the effect on well-being is reported to be more positive than in tended natural environments for some interviewees.

"One criterion is the accessibility: the furthest away from the next road as possible. That is the easiest criterion. [...] That fascinates me. [...] Ideally there would be no human influence at all." (Interview 1)

Besides accessibility interviewees report the importance of being able to use natural environments for different activities, e.g. for recreation, walking, running, playing or picnicking. If these opportunities are provided, it is anticipated these areas will be especially positive for well-being.

"Mostly, where you can sit, and for instance barbeque some sausage. [...] I don't even want to go in the nature protection area, where it is prohibited to light a fire. In my opinion, that is beautiful just from an expert perspective, but for well-being and to leave everything behind, I'd chose a different area." (Interview 6)

Considerations about different usage of natural areas seem to be especially important if children are involved. Infrastructure that offers a variety of opportunities, inviting the visitor to be active in natural environments, such as paths, fire places and water, are described as contributing to a positive effect on well-being.

"Are there additional attractions for children? Where is a fireplace? Right now, we still have children in the stroller, thus it must be walkable with stroller. Is there a waterfall [...] water, where the children can play [...] Basically visual stimuli are important, too. But so are noise, sound, the fact you can drink it. You can put your feet in it. It simply invites you to stay there." (Interview 1)

This aspect is closely related to the idea of feeling free, which is assumed to be more possible in natural environments than in urban environments, and which positively influences human well-being.

"You are expecting a bit more freedom than usual. I can stop whenever I want to, I can walk wherever I want to, I can sit wherever I want to, I can speed whenever I like. Nobody is coming up to say, you have to drive 60 km/h, nor do we find red traffic lights. In nature, we expect more degrees of freedom." (Interview 6)

Interview results suggest the "usefulness" of natural environments play an important role effecting human well-being. Accessibility as well as opportunities for various activities leads to feelings of freedom and therefore a positive impact on well-being. Differences between the effect of natural environments in daily situations for

individuals with more time are clearly distinguished: accessibility and opportunities are important for an increase of daily well-being. If more time is available, a stronger increase of well-being is reported with decreasing accessibility. If individuals have the time to access "wild" natural areas, and avoiding crowds of people, well-being is enhanced.

4.3.3.2 Effect: Contrast with Everyday Life

The central effect of accessibility arising from the interviews constitutes the "*contrast with everyday life*", assessed to be the central aspect of nature-contact effecting well-being in a positive way. If natural areas provide a contrast to daily environments, the possibility to gain a distance and get away from daily hassles arises. People concentrate on things other than daily routines, which assists to change the focus of their minds. The opportunity to be in a different location was also reported as an important aspect for restoration and well-being. Besides the change of location, the involvement of all senses also seems important for well-being.

"What's affecting wellbeing [...] may be the green in contrast with the grey stone, and concrete and asphalt reality; with the noise of the city, it's quietness; with the motor-smell it's fresh air [...], with the hard ground it's the soft, bouncing ground." (Interview 3)

The positive impacts reported may arise for different reasons. Firstly, the phenomenon of "being away" is described as being positive for well-being.

"The main part is, I don't have to be all by myself, that's not it. But I am far away, I am gone, gone from civilization." (Interview 15)

Secondly, the "absence of everyday stimulation" is perceived as especially restorative, increased by a contrast with everyday life: interviewees' responses state that the positive well-being effect increases with distance between everyday life and achieved within natural environments.

"In these fast moving times, we are confronted with changes all the time – look at Zurich main station, there is some new barrier or block every day, something different. You look for specific things in nature that change more slowly. [...] The overall impression a forest makes is one of long living stability. And that's something, which is a balance to the daily bustle. The

stockbroker, who decides in milliseconds, signing stocks, might look for something that takes 150 years until it's done. It is the contrasts which attract each other." (Interview 6)

Besides the perceived effect of "getting away" when visiting natural areas in general, this effect is described especially strong in rather wild forest areas compared to tended environments: the higher the contrast, the stronger the effect of "getting away". Forests, and wild forests in particular, shield individuals from noise and the visual aspects of civilization, providing a stronger contrast and a more positive effect on human well-being.

"In open land you always look at civilization. It is present all the time, and you still hear the traffic noise far away. When you are in the mountains, you hear the highway. For me, the restorative effect is quickly destroyed. [...]. In forests it's different, I don't see it. I only see as far as the next path cross-roads or the next tree." (Interview 6)

As a category "contrast with daily life" integrates different aspects mentioned in the interviews, which lead to a positive impact on human well-being. First, the fact that all senses are involved, and second, the absence of urban stimulation and the presence of natural stimulation play an important role in this category. Interviewees distinguish between the effects of natural and urban stimuli: while the presence of natural stimuli is seen to influence well-being positively, urban stimuli influence well-being negatively. The more urban stimuli, the less positive is the effect on well-being, and the vice versa. Similar sensual sensations can evoke a positive or a negative reaction, depending on the source of the stimuli.

"For me, monotony is more than a soundscape. For example, a road with traffic is extremely disturbing. A creek, which has a monotonous soundscape, too, is really comforting." (Interview 4)

Intensively cultivated and farmed landscapes are assessed less favorably for these reasons. They are perceived as being artificial, especially from people using nature for recreational reasons. Thus, they suggest it affects their well-being less favourably or even negatively.

"Well, with the intensively used meadow, I feel an aversion [...] I only see the monotony: animals cannot even live there any more, e.g. worms, insects, bacteria, they are not there any more, just as remnants maybe. I feel restrained and rather annoyed and sad." (Interview 10)

Wild nature or wilderness, understood as the lacking intervention of maintenance, on the other hand, is assessed positively, associated with mystery and fascination. Intensive maintenance is expected to have a less positive impact on well-being compared to low maintenance by all interviewees. Therefore, we do not have a directed hypotheses for the subsequent quantitative test. We propose there are perceived differences between the effects of wild and tended natural environments.

4.3.3.3 Process: Mental Focus

Closely connected to the category "*contrast*" from normal life is the subsequent process of "*changes in the mental focus*". According to interviewees, this is the main focus leading to well-being. The interviewees report a change of thoughts when visiting natural areas. Natural environments in general attract the attention of the visitors, releasing two processes positively influencing well-being: drifting away from everyday concerns, forgetting them; or staying with daily hassles with a changing perspective. Both reactions activated by natural areas are described as positively influencing well-being. These two processes cannot be clearly separated, and they do not necessarily have to follow each other.

Drifting Away from Everyday Concerns

Drifting away from everyday concerns is possible in natural environments in general, evoked by the effect natural environments have on attracting attention. This process is described to be an important value of natural environments by interviewees, seen to enable an opening of the mind, and, in the second phase, enabling new ideas.

"... when I run through the forest, I would like to get away mentally, from worries or work. And here [pointing at photographs of tended nature] I walk along and I can get lost in my mind, but here [pointing at photographs of wild nature] I am, personally, much more distracted, because I see things, and I get involved with them." (Interview 4)

The possibility to mentally drift away from everyday concerns is perceived to be stronger in wild natural areas than in tended ones.

Change of Perspective

In general, natural environments are reported to attract the attention of visitors, evoking the phenomenon of forgetting everyday concerns and drifting away from everyday thoughts. This process is described as an important value of natural environments, enabling an opening of mind and new ideas.

"Anyway, it is mind-expanding. Many times, I come with a limited mind, or I am lost in specific problems. And after being outside in nature for a couple of hours, a lot opens up again." (Interview 1)

"Well, yes, I see things maybe, which troubled me before... I see these maybe not as narrowly any more." (Interview 8)

As one interviewee mentioned, landscape does not even need to be consciously perceived, it rather provides scenery, which provides room for individual thoughts. The drifting away-process then leads to a change in perspective.

"I sometimes don't even look any more, at the landscape, I'm involved with my own thoughts." (Interview 2)

The process of getting away from everyday life is not necessarily conscious, but some interviewees consciously seek this effect when deciding to go on an excursion in nature. In such cases they look especially for wild natural landscapes, expecting a stronger effect than in tended natural areas.

[Worries] "are turning around in my head. I turn them around and around and put them to their place basically. And I explore solutions, alternatives. [...] When I am in the forests with my family, these thoughts can settle down, that is not a conscious process. My everyday problems move to the background." (Interview 1)

Interviewees believe that spending time in nature decreases everyday worries by attracting attention away from these towards nature. The effect of drifting away is perceived in wild forests in particular. The focus on either daily life or nature is distinguished between different natural conditions. Interviewees report different thoughts arising, depending on the kind of natural area experienced. When wild natural environments are perceived to draw away thoughts from daily hassles, well-being is experienced more strongly.

4.3.3.4 Implications: Perceived Aspects of Well-being

The consequences of nature-contact are illustrated by changes in well-being aspects. The reported consequence following the process of being away is perceived to be positive changes in "calmness". Interviewees suggest that tended nature provides this process already, and wilderness intensifies this process.

"For me, a wild nature environment is relaxing, I forget worries and difficult thoughts, and I feel fairly calm and do not get upset. I rather say 'Well, look, there is still something like an ideal world' and that is soothing for me. That is not possible here [photographs of tended nature], where my mind keeps on working." (Interview 4)

Besides the soothing effect, natural environments in general seem to have surprising aspects for visitors, leading to fascination. The calming effect is attributed to feeling fascinated and inspired by nature.

"On the one hand, if it is moving, on the other hand, by the inspiration of nature itself, the play of colours calms me down. It is relaxing." (Interview 11)

The calming effects of nature are perceived to be especially strong in wild forests and appear to occur more quickly in wild forest conditions than in other natural conditions.

"I think, a wild forest is calming me down, it serves my needs much more than a tended forest. In a tended forest I have to walk for maybe two hours to get calm and think 'Okay, now I feel fine again', and in a wild forest one hour is enough for that." (Interview 14)

A third reported consequence of visiting natural environments is the change of perception of ones' own problems. Continuity and change in natural environments are noticed. Both processes happen at the same time. Continuity leads to familiarity and connectedness, while change of scenery, e.g. with season, leads to a dynamic feeling. This change is noticeable especially in wild forests and arouses people's interests, which enables a change of perspectives of their own hassles and existence.

"What excites me in wild, untouched nature: well, if you stand in front of an oak for example, a wooden oak. It is 450 years old, which is a fascinating time dimension for me. The impulse to stop for a moment. When has it already been here, it still stands in year 2000. I get an idea of time: What's time? What is time anyway? And a certain respect. ... I have to say, what you are deciding today, it's peanuts anyway." (Interview 6)

"It is something I cannot control, and this is what fascinates me in nature. I feel myself to be unimportant, it is a lesson in modesty." (Interview 15)

Interviewees felt the relativization of people's individual existence and the perception of not being as important comparison to nature, leading to the renewal of used resources, feeling restored.

"It brings clarity. [...] When the problems get more serious, I like it [being in a forest], in those cases nature gives me a lot. Because I feel small again in nature. I think 'Like everything, you are just an atom, maybe not even an atom in the whole cosmos, well, what's it about.' And I know, I will not be able to completely lose my concerns anyway, but maybe it helps me to get energy again to solve problems better, to apply my energy better." (Interview 15)

In wild natural conditions this effect of putting ones' own worries into a different perspective, gets intensified.

"... but in wild nature, it affects me much more [...] to say, there are not only negative things, but, 'look, isn't that nice?' Then again you notice it, maybe from a totally different perspective. That sensation I would never have in a tended landscape." (Interview 4)

4.4 Study 2: Quantitative Method

In the second part, we tested the qualitative model. Aspects and relationships were operationalized by measurable variables. Well-being dimensions, presented as the consequences of exposure to natural environments in the model, namely "calmness", "good mood", "depression" and "anger" are used as dependent variables to test the model empirically.

4.4.1 Environmental Stimuli

To test the qualitative results, a field experiment was carried out in an urban forest located ten minutes from the centre of Zurich. The area included one route in a relatively "wild" area, which has been extensively used for six years, and one route in a relatively "tended" area, which is still maintained and used economically. While an analysis of differences between wild and tended forest is described in chapter 5,

the main goal is testing the general model here. Due to the elaborate experimental field approach, we reduced the setting to wild and tended forests, excluding open land. Both areas included routes that had the same starting and end-point, and the participants were randomly assigned to the different routes. The experimental set-up is shown in Table 4.2.

Table 4.2: Experimental set-up

1 st pre	Treatment	2 nd post
Measures: Self-reported well-being	30-40 minute walk in either the wild or the tended forest area (map indicating the route): participants randomized to one of the conditions	Measures: Self-reported well-being Perceived accessibility Perceived biodiversity Mental focus on work Mental focus on nature

4.4.2 Design and Participants

Participants included students, academic and non-academic staff from universities of Zurich as well as the general public (including retirees) To avoid an economic motivation, participants did not get paid. After participating people had a 50% chance to win a cinema ticket.

Participants were randomly assigned to one of the experimental treatments "wild forest" or "tended forest". They were asked to walk one by one to avoid social interaction, seen as a variable influencing well-being. Weather conditions were comparable for all participants. No significant differences existed between the groups concerning weather and temperature. The experiment was carried out between June and early September in daylight between 8 am and 7 pm.

There were N = 100 participants in total. The data of four participants had to be excluded for procedural reasons (e.g. rainy weather), leaving a total sample of n = 52 in the "wild" forest condition and n = 44 in the "tended" forest condition. Participants had a mean age of 37.6 years, 56 % female and 44 % male.

4.4.3 Measures

Self-reported well-being was assessed by 32 mental state items, adapted from mood scales ("Befindlichkeitsskalen"; Abele-Brehm & Brehm, 1986). This multidimensional instrument is based on the two dimensions Tension versus Relaxation and Positive versus Negative self-assessment of mood (see chapter 1). The tool is sensitive to short-term changes (Abele-Brehm & Brehm, 1986), therefore suitable for our research design which required a 30-40 minute time-frame. Qualitative results led us to be interested in four states: "good mood", "calmness", "anger" and "depression", each measured by four items. The items were rated on a scale ranging from 0 (not at all) to 8 (very much). Perceived biodiversity, accessibility, the mental focus on work and the mental focus on nature were assessed directly by the participants on a rating scale ranging from 1 (low) to 7 (high).

Table 4.3: Reliabilities for well-being dimensions according to qualitative results

Dimension of well-being	Cronbach's alpha
"Depression" (e.g. gloomily)	0.887
"Good Mood" (e.g. joyful)	0.869
"Anger" (e.g. irritable)	0.866
"Calmness" (e.g. relaxed)	0.871

Note: Items translated from German; item parameters tested for German speaking sample

4.4.4 Analysis

In this analysis, we were interested in testing the model arising from qualitative data. The comparison of wild and tended forest conditions is addressed in chapter 5 only.

A check of the reliabilities of well-being scales in our sample showed rather high alpha values for each scale (see table 4.3). No items were excluded. To test our hypotheses derived from the qualitative interviews, we conducted one-factorial covariance analysis, taking the pre-treatment well-being as a covariate and post-treatment well-being as the independent variable for the four dimensions. "Depression" and "Anger" scales for negative well-being and "Good mood" and "Calmness" for positive well-being were used. We calculated results on basis of an α -error level of $p \leq 0.05$. Since it is an exploratory design, we indicated results with an α -error level of $p \leq 0.10$, which might be interesting for further research.

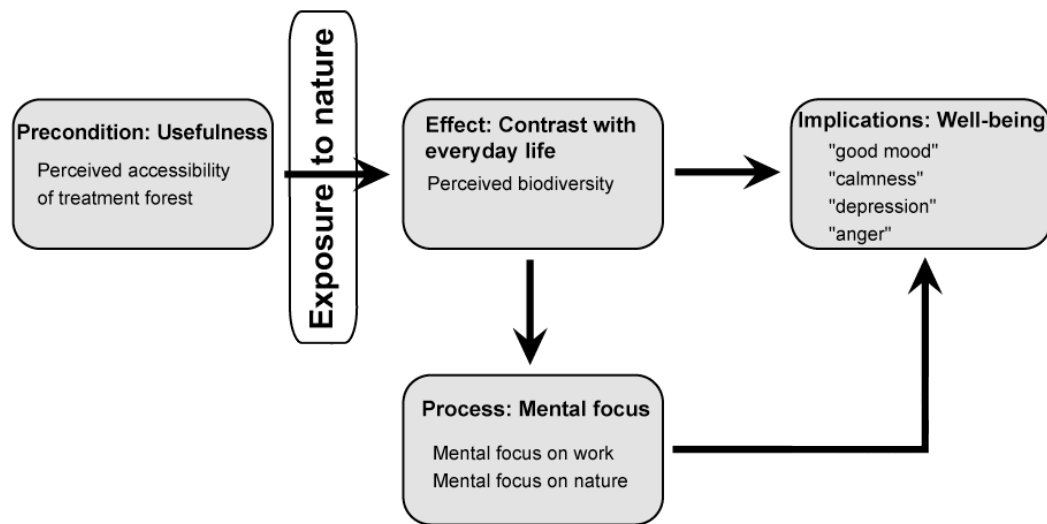


Figure 4.5: General influence model including the operationalisation concepts

4.4.5 Quantitative Results

To give an overview on the relations of the variables, which arose from the qualitative statements, the qualitative model is shown in figure 4.5, supplemented by the concepts to operationalize the model. We conducted correlations, illustrated tables 4.4 and 4.5. The relationship of the focus of mind and positive well-being, which was proposed in the qualitative interviews, gets obvious when we face the

correlations between these variables. While the mental focus on work is negatively correlated with "good mood" and "calmness", the mental focus on nature correlated positively with both dimensions (see tables 4.4 and 4.5).

Table 4.4: Intercorrelations for the model variables "good mood" and "calmness" (N = 96)

	1	2	3	4	5	6	M	SD
1 "Good mood"	1	0.74 **	0.145	0.74	- 0.27 **	0.33 **	5.98	1.21
2 "Calmness"		1	0.17	0.19 (*)	- 0.24 *	0.32 **	5.90	1.25
3 Accessibility			1	0.12	0.07	0.25 *	6.84	0.45
4 Perceived biodiversity				1	- 0.04	0.19	5.00	1.01
5 Mental Focus: Work					1	- 0.20	1.96	1.93
6 Mental Focus: Nature						1	3.60	1.73

Note: 2-tailed test with (*) $p \leq 0.10$; * $p \leq 0.05$; ** $p \leq 0.01$

Table 4.5: Intercorrelations for the model variables "depression" and "anger" (N = 95)

	1	2	3	4	5	6	M	SD
1 "Depression"	1	0.68 **	- 0.15	- 0.12	0.15	- 0.33 **	0.76	1.02
2 "Anger"		1	- 0.77	- 0.12	0.28 **	- 0.27	0.49	0.83
3 Accessibility			1	0.12	0.07	0.25 *	6.84	0.45
4 Perceived biodiversity				1	- 0.04	0.19	5.00	1.01
5 Mental Focus: Work					1	- 0.20	1.96	1.93
6 Mental Focus: Nature						1	3.60	1.73

Note: 2-tailed test with (*) $p \leq 0.10$; * $p \leq 0.05$; ** $p \leq 0.01$

Correlations are not feasible to show causal effects (Bortz, 1993). Thus, we conducted two univariate covariance analyses, using the well-being dimensions mentioned by the interviewees as dependent variables to test the influence of the proposed variables arising from the qualitative data: "accessibility", "perceived biodiversity", "mental focus on work" and "mental focus on nature" were tested as independent variables in the analyses. Since we were only interested in a change of well-being, the post treatment measures for "good mood" and "calmness" were used as dependent variables. The pre treatment measures on these dimensions were used as covariates to exclude the influence of different baselines on the effect of the dependent variables.

Accessibility

According to the general model revealed by the interviews, accessibility is a precondition for well-being. We expected a more positive impact on well-being with increasing accessibility, measured by the "perceived accessibility by paths" in the forest area.

Accessibility has a significant influence on the negative well-being dimension "depression", which is decreasing more, if there is a high perceived access to the natural area. This indicates that forests need to be accessible to the public to positively influence well-being. However, accessibility did not show a significant influence on "good mood" and "calmness" did not show significant changes due to the accessibility.

Contrast with everyday life

In the interviews a contrast with everyday life was a positive factor for well-being, revealed by accessibility. We expected a more positive impact on well-being with increasing contrast with everyday life, operationalized by the variable "perceived biodiversity".

A significant effect on the change of well-being was shown. The positive dimensions of well-being "good mood" and "calmness" increased significantly with increasing perceived biodiversity, while "depression" decreased with increasing perceived

biodiversity (see Tables 4.6 and 4.7). The relationship between accessibility and contrast with everyday life could not be confirmed, as the correlation is not significant (see tables 4.4 and 4.5).

Mental Focus

In the qualitative part of the study, the relation between natural environment and the mental focus was mentioned to be an important process arousing and leading to well-being. Thus, we proposed two processes revealed: a more positive influence on well-being with the process of drifting away from everyday concerns, operationalized by "mental focus on work" and a more positive influence on well-being with the process of a change of perspective, operationalized by "mental focus on the course of nature".

The quantitative test showed that people's mental focus strongly influenced the "depression" and "anger" dimensions of well-being. Both dimensions decreased more strongly if the values for mental focus on work were low, and values for mental focus on nature were high. The hypotheses could be confirmed for a "anger" and "depression", both decreasing significantly with decreasing "mental focus on work" and increasing "mental focus on nature" (see table 4.7). The positive dimensions of well-being did not, however, appear to be affected by the mental focus.

Table 4.6: Results of Covariance Analysis showing the effects of natural characteristics on well-being dimensions after the treatment

		"Good mood"	"Calmness"	"Depression"	"Anger"
	df	F	F	F	F
1 Accessibility	2	0.88	1.83	2.67 (*)	0.41
2 Perceived Biodiversity	5	4.67 **	4.35 **	1.99	2.77 *
3 Mental focus: work	6	1.00	1.88	4.42 **	14.45 ***
4 Mental focus: nature	6	0.13	0.87	4.05 **	7.36 ***
Error within groups	20	(0.79)			

Note: * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$; adjusted R^2 for "Good mood" 0.46; adjusted R^2 for "Calmness" 0.50; adjusted R^2 for "Depression" 0.79; adjusted R^2 for "Anger" 0.88

4.5 Discussion

The reported studies developed a qualitative mental model and tested it quantitatively. In general, the processes involved in relationships between natural environments and human well-being become clearer. Findings demonstrate the possible influence of different natural conditions on well-being in detail. Connections between the different concepts relating to impact are clearer, and provide a basis for planning natural areas. These ideas support the notion of health promoting landscapes (Ammer & Proebstl, 1991) and projects integrating the positive impact of natural environments (Townsend, 2006).

People show different needs for everyday well-being and weekend or holiday well-being. Everyday well-being is influenced more by easily accessible natural areas close by. This is not surprising, as people living in urban surroundings will tend to seek their daily restoration close to their living and working place environments (Ammer & Proebstl, 1991). The amount of people who have contact with natural environments depends on how far these are from where the people live (De Vries, 2003).

Usefulness

Perceived usefulness has been shown as a precondition for individuals to experience a positive effect from natural environments. Effects on well-being relating to usefulness are divided into physical accessibility and the opportunity to freely act in natural areas. At first sight, the perceived relationships between these concepts appear contradictory as accessibility seems to increase with an increasing degree of maintenance, influencing the level of overall positive effect on daily well-being. Opportunities to actively use natural environments are expected to be highest in natural environments that are maintained at a medium level, suggesting the strongest positive change in well-being. It is expected that well-being will not increase as

much in either extreme wild or tended forest conditions, due to a limitation of possible activities.

The different needs required for everyday well-being and for weekend or holiday well-being have become clearer. Everyday well-being is more greatly influenced when nature is accessible, consistent when considering that urban populations seeking daily restoration frequently use urban natural environments (Ammer & Proebstl, 1991). People living in urban areas will benefit most from easily accessible natural environments they can visit regularly.

However, the positive dimensions of well-being were not affected by the perceived amount of accessibility when tested quantitatively. This is only partly consistent with earlier findings, which have shown "pleasure" to be positively affected by having highly accessible natural areas (Staats et al., 1997). We assume the positive effect of accessibility did not feature due to the research setting: earlier studies used photographic stimulation, and measured the perceived accessibility on these photographs (Herzog et al., 1997; Staats et al., 1997; Herzog et al., 2003; Staats & Hartig, 2004), while this study used real natural areas with paths leading through the area to make it possible to walk in the experiment. This indicates that the variation of perceived accessibility was smaller than on photographs. Thus, the effect of accessibility would be rather small, failing to show significant effects on well-being. Both treatment conditions involved accessible areas, with smooth ground surfaces. A smooth surface is also considered to be positive in itself (Herzog et al., 2003), possibly responsible for the overall increase of well-being in our study.

Further research is needed to analyze different degrees of wilderness, including a comparison of more than two groups from tended to wild conditions (Shrestha et al., 2007; Quine & Watts, 2009), with gradually different levels of accessibility.

Contrast

The main finding arising from the qualitative aspect of this study is the contrast to daily life experienced in natural areas. The assumption that the absence of urban and the presence of natural stimuli leads to a decrease in anger and depression is

supported, while the positive dimensions of good mood and calmness were only marginally effected. The more positive influence of natural stimuli is consistent with existing research comparing the human well-being effects of natural and urban environments (Staats et al., 2003; Hartig & Staats, 2006; Kaplan, 2007).

Mental Focus

According to the interviews, the most important process arising from a natural visit is the change in mental focus, including drifting away and eliciting of new ideas. Kaplan and Kaplan (1989) described this phenomenon as the concept of being away, shown to be the strongest factor promoting restoration (Laumann et al., 2001). Interestingly, the effects of nature attracting attention and the possibility of "being away" are described to be an unconscious process which positively affects well-being. Yet, the effect is perceived and initiated consciously to increase personal well-being. People actively seek the contrast with everyday surroundings in natural areas to experience "being away". The influence of wild and tended forests needs to be focused, which is addressed in chapter 5.

The separation between these processes, "drifting away" and the possibility of exploring new ideas about daily life found in the interviews supports the findings of Laumann and colleagues, who divided the Kaplans' "being away" factor into "novelty" for being physically away and "escape" for being psychologically away (Laumann et al., 2001). Hammit divided these ideas into "being away to" and "being away from" (Hammit, 2000). It appears that humans tend to actually seek the contrast to get away from it all and seek new stimulation at the same time. Visitors may be aware of the positive effect of "getting away" on their individual well-being. The mental focus on nature shows a significant influence on the anger dimension only, anger decreasing more strongly if the participants focus on nature. Findings suggest that the positive effect of natural environments is still possible when a person concentrates on work-related topic if natural environments lead to the second process mentioned, an eliciting of new ideas. This hypotheses requires further investigation.

Consequences: Aspects of Well-being

Interviewees mentioned well-being as a consequence of natural visits, including calmness as well as fascination and the putting one's own life into perspective. Fascination represents one aspect of Attention Restoration Theory (Kaplan & Kaplan, 1989).

Focusing on single categories, these results support findings of earlier studies relating to the positive influence of natural areas on psychological well-being (Ulrich et al., 1991; Staats et al., 1997; Cackowski & Nasar, 2003; Van den Berg et al., 2003). Noteworthy is the stronger decrease in the negative dimensions of well-being than the increase in the positive dimensions. We believe this is due to the positive effect in general of nature-contact, but more of these items need to be tested in future experimental work. It is possible that the process of experiencing a positive change needs more time to occur (Hartig & Staats, 2006) than for negative dimensions to decrease. Further research is required in order to answer this question.

4.6 Conclusion

Results of this study demonstrate that natural environments have a positive impact on health due to internal processes initiated by the environment on visitors. These findings actively contribute to the planning of health supporting environments considering the following aspects. First, we have need to distinguish between different needs people have concerning natural environments. Tended natural environments with good access serve the everyday well-being needs of urban-based individuals. The need for more wild areas is obvious for weekend or holiday well-being. In urban environments, which was focused in our study, a certain amount of tending is expected and positively influences well-being by encouraging activity. This is the case at least in forest areas. Other forms of nature need to be further analyzed.

Second, an important factor in examining the well-being impacts of contact to nature is accessibility to the natural environment. Accessibility needs to be provided for visitors to actively use the space and subsequently influence well-being. The size of access pathways does not seem important, people basically need the opportunity to walk and experience the natural environment. Close-by residential public green space can easily enable access and thus provide a restorative potential to promote everyday well-being. Carefully designed accessibility is one aspect which needs to be integrated into the planning of urban natural forests and natural areas.

Third, psychological processes arising from time spent in natural environments, like the drifting away from daily thoughts and changing perspectives support the positive effects of natural environments. These need to be supported by a planned management of urban forests. The influence of different forest conditions will be topic of further research reported on in chapter 5.

Since widespread forests are not feasible in most large cities, we recommend having an extensive management of urban forest areas to support psychological well-being, providing accessibility, allowing a contrast to daily life. These would allow people a change of perspective and an increase in psychological well-being.

Urban natural areas with bushes and paths enabling a direct and active exposure can provide especially cumulative restoration and well-being experiences. Close by small-scale natural areas can serve peoples' health and well-being, allowing restoration to take place between daily tasks in the midst of daily problems and concerns, and lead to repeated restorative experiences (Hartig, 2007). Thus, by a cumulative effect on restoration and well-being, public health can substantially be promoted in everyday settings. Such findings should be considered when planning natural environments in order to actively promote psychological well-being as a crucial part of health.

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5 Walking in Wild and Tended Urban Forests: the Impact on Psychological Well-being

5.1 Abstract

The positive effect of natural compared to urban environments on human restoration and well-being has been proved in various studies. To get more specific results for planning processes of urban natural areas, we question if this positive effect is consistent in different natural conditions, namely wild and tended urban forests. In an experimental setting, participants ($n = 96$) were randomly assigned to either a walk through wild or tended forests for 30 minutes. Multidimensional scales in a pre-post-treatment-setting measured well-being. Results indicate a marginally stronger positive effect on fatigued persons on "activation" and "lethargy". Other dimensions showed an improvement after the walk, independent from the amount of fatigue. Furthermore, a walk in tended forests showed a stronger change in "good mood", "calmness" and "depression", indicating a more positive effect of tended compared to wild forests. The aesthetic evaluation of the natural area did not effect this change. This implies that attitudes do not self-evidently predict well-being as suggested in prior research. The results give important advice to design natural areas serving restoration and public health, especially for people living in urban environments.

5.2 Introduction

Natural environments play an important role in people's everyday lives for recreational and aesthetic reasons (Ulrich, Simons, Losito, Fiorito, Miles & Zelson, 1991; Hartig, 1993; Van Kamp, Leidelmeijer, Marsman & De Hollander, 2003; Nielsen & Hansen, 2007). Due to growing urbanization in Europe the importance of natural areas in urban contexts increases. Recreation for people living in urban environments will become a permanent topic in the future (Wagner & Gobster, 2007). The positive impacts of natural areas on recreation and well-being are perhaps evident (De Vries, 2003), but there is a deficiency in sound scientific knowledge on how to design these natural areas in specific. Aspects supporting restoration and well-being need to be identified to ensure that environmental quality is included in the design of urban natural areas (Brown, 2003). To design valuable space for public restoration, there is a need to focus on different types of natural environments and their specific effect on restoration and well-being. In this context, this article deals with the following research questions:

Do wild and tended forest conditions influence well-being differently?

The most common approach to analyzing the impact of natural environments is to compare them with urban environments. Facing stress reduction and cognitive attention, one study showed that participants who waited in a room with window-view on trees before going for a walk in a nature reserve had a greater stress reduction and a slightly increased attention capacity than participants who waited in a viewless room before going for a walk in urban surroundings (Hartig, Evans, Jamner, Davis & Garling, 2003). Another study used a scary movie first before presenting participants either a natural video or a video with built environment. Consistently, attention was better after watching the natural video, and positive affect increased, while the pattern was the other way around after watching the built environment video (Van den Berg, Koole, & Van der Wulp, 2003).

Thus, the superiority of natural environments over urban environments has been confirmed empirically by several studies, e.g. by invoking cognitive performance (Berto, 2005) and affective improvement (Pretty, Peacock, Sellens & Griffin, 2005).

However, there is a research gap on the variation of different natural conditions. Some early pioneer work has been dedicated to this question. After strong situational stress in the initial phase, a more positive effect on affective and cognitive performance has been shown after a vacation in wilderness areas compared to a vacation in less wild natural environments (Kaplan & Frey Talbot, 1983; Hartig, Mang & Evans, 1991). Due to the exploratory character of these studies, the ability to generalize the results is limited. Later experimental work using walk-order photographic stimuli analyzing the effect of specific natural characteristics has shown high vegetation density and low accessibility of forest areas to positively influence arousal and negatively influence pleasure (Staats, Gatersleben & Hartig, 1997). These recent findings lead to the prediction of a more positive influence of tended natural areas. Therefore, our hypothesis proposes a stronger effect of tended forest on psychological well-being compared to the effect of wild forest (hypothesis 1).

Does the aesthetic evaluation of environments have an influence on well-being?

Preference studies might help generalizing hypotheses about well-being, since these concepts are closely related: in a mediational analysis, van den Berg et al. showed that affective restoration, measured by ratings of beauty, is responsible for a substantial proportion of the preference of natural over built environments (Van den Berg et al., 2003). The distinguishing of different natural environments has been topic of preference studies, which are supposedly closely related to well-being (Laumann, Garling & Stormark, 2001). Focusing on environmental qualities leading to individual preferences, the information processing theory (Kaplan & Kaplan, 1989) suggests that humans develop a need for information about their environment, representing demands for particular environmental conditions (Table 5.1).

Table 5.1: The preference matrix (adapted from Kaplan und Kaplan, 1989)

<div>Availability of information</div> <div>Informational needs</div>	Immediate	Inferred, predicted
Understanding	Coherence	Legibility
Exploration	Complexity	Mystery

The preference matrix is based on the availability of information and the informational needs. It defines different conditions of environment in relation to the different individual needs (Kaplan & Kaplan, 1989). People prefer environments with characteristics which satisfy these needs. The influence of these four patterns on aesthetics has been shown in various empirical studies (e.g. Hartig et al., 1991; Laumann et al., 2001; Chang, 2008). Mystery and legibility have a strong positive influence on preference (Bourassa, 1991). A moderate degree of coherence and complexity is claimed to be supportive for a positive aesthetical evaluation (Kaplan & Kaplan, 1989).

Studies that analyse specific characteristics of natural environments are most often found to be concerned with aesthetic perception and preferences of natural environments (Herzog & Stark, 2004; Jim & Chen, 2004; Ribe, 2005; Garcia, Hernandez & Ayuga, 2006). Natural characteristics, such as well-maintained ground surfaces, limbed up trees (log piles) and shrubs, which allow visual access and movement, have been shown to be preferred by people (Herzog & Kutzli, 2002; Herzog, Maguire & Nebel, 2003). Preference is influenced by different expectations towards natural environments. The empirical connection between preference for natural areas and their effect on well-being has been shown by high correlations (Laumann, 2001). However, causal relationships have not been established. Since affective restoration is responsible substantially for preference of natural over built

environments (Van den Berg et al., 2003), we expect a higher impact on well-being from tended natural environments due to a preference by participants (hypothesis 2).

Do individual needs for restoration play a role in the effect of environment on psychological well-being?

Much empirical work has been based on Attention Restoration Theory (Kaplan & Kaplan, 1989), which states that natural environments attract involuntary attention. This process enables directed attention, needed in daily urban contexts, to be restored. This effect has been demonstrated empirically with cognitive performance increasing more strongly after visiting natural, rather than urban, areas (Hartig et al., 1991). The positive impact on psychological well-being after perceiving natural, as opposed to urban, environments is closely connected to the restorative effect (Van den Berg, 2005; Tzoulas, Korpela, Venn, Yli-Pelkonen, Kazmierczak, Niemela et al., 2007). One trend of empirical research has been to distinguish the different needs of people concerning their focused attention (Korpela & Ylen, 2007; Morita, Fukuda, Nagano, Hamajima, Yamamoto, Iwai et al., 2007). By manipulating mental fatigue in the experimental conditions, studies consistently showed a stronger positive effect of natural compared to urban environments for mentally fatigued persons, assuming they have a stronger need for restoration than mentally fully refreshed persons (Hartig et al., 2003; Staats, Kieviet & Hartig, 2003; Hartig & Staats, 2006). Thus, the individual need for restoration has been included in our study: assuming a strong relationship between restoration and well-being, we propose a stronger effect on well-being for mentally fatigued persons (hypothesis 3).

With these research questions, our empirical approach comparing the effect of wild and tended forests on psychological well-being follows two aims. Firstly, the aim of the experimental work is to make some headway in distinguishing effects of different natural conditions. Secondly, we aim to contribute to the debate on how to design natural areas, e.g. in the case of derelict land, in order to support human well-being. The empirical work creates a base for evaluating different natural conditions and assist decision processes in the design of urban natural environments.

5.3 Method

In order to answer our research questions, we distinguished between different degrees of maintenance of the forests: a comparison between the effect of wild and tended forest conditions is the main focus of the research. Forest conditions were presented in an experimental field design, including some physical activity by the participants.

5.3.1 Environmental stimulations

A two-stage independent variable of forest-maintenance – wild versus tended – has been created as rigorously as possible to exclude other forest characteristics, which might possibly influence results on well-being. The time span, in which the forest area had not been used economically, served for selection: the wild area had not been used economically for 6 years, while the tended forest was still economically used and maintained. Natural scientists and forestry experts developed the relevant criteria to distinguish the forest areas (Table 5.2). They were significantly involved in selecting an urban forest in Zurich suitable to these criteria. The forest provided different degrees of maintenance, namely rather wild and rather tended forests. Two routes representing the wild and tended conditions were selected.

Table 5.2: Visual differentiation of the forest conditions wild and tended

	Signs of conomical use and care	Amount of dead wood	Vegetation density
Wild forest area	None	High amount of dead wood	High amount of brush wood
Tended forest area	Piled cut logs near path	Low amount of dead wood	Low amount of brush wood

Besides the mentioned variables, which might be involved influencing well-being and aesthetical assessment, other forest walk characteristics were chosen to be comparable between the two routes: Accessibility was given by pathways of the same size and slope, the distance to traffic and the proportion of roads in view was the same, and both forest areas were easy to reach by public transport, ten minutes from the town centre, to avoid effort justification effects (Aronson & Mills, 1959). By these considerations, we specified the two-stage independent variable of forest maintenance – wild versus tended – as rigorously as possible to exclude other forest characteristics, which might possibly influence results on well-being. Exemplary images of the forest conditions are presented in Figures 5.1 and 5.2.



Figure 5.1: Scenes wild forest walk condition



Figure 5.2: Scenes tended forest walk condition

5.3.2 Design and participants

Participants were recruited from the universities of Zurich, including students, academic and non-academic staff. Additionally, flyers were distributed in public libraries, cafes, and on the internet as well as in university lectures for elderly people. To avoid an economic motivation, participants did not get paid although, after participation, they had the opportunity to win a cinema ticket with a 50% chance.

The participants were randomly assigned to the experimental conditions of either wild or tended forest. From our initial sample ($N = 100$), we excluded data from four participants due to procedural differences, such as weather conditions. The remaining sample consisted of 52 participants in the wild forest condition and 44 in the tended forest condition. Morning ($n = 48$) and afternoon ($n = 48$) sessions, indicating a different degree of need for restoration, were equally distributed. There were 56 % female and 44 % male participants with a mean age of 37,6 years.

5.3.3 Measures

Questionnaires to be answered before and after the walk were administered. Well-being was assessed by self-rating scales of mental state, adapted from Abele-Brehm and Brehm (1986). Practice has shown this to be a sensitive instrument for short-term changes (Abele-Brehm & Brehm, 1986), which was an important criterion in the experiment to measure changes after 30 minutes. The instrument is based on two stable elementary dimensions: tension versus relaxation and positive versus negative assessment of own mood, which are represented by eight aspects ("activation", "arousal", "good mood", "reflection", "calmness", "lethargy", "anger", "depression"), each measured by five items. To shorten the procedure, we reduced these to four items per scale, excluding those items with lowest internal consistency in the norm samples. The attribute items were rated on a scale ranging from 0 (not at all) to 8 (very much).

The perceived attractiveness and control variables such as the perceived threat in the natural area visited were asked for in questions after the walk to be answered on a scale ranging from 1 (not at all) to 7 (very much). Additionally, demographic data were given, e.g. age, gender and education.

5.3.4 Procedure

The experiment took place from June until early September in sunny weather conditions, sessions undertaken during daylight between 8 am and 7 pm. After answering an initial set of questions at the first post (Abele-Brehm & Brehm, 1986),

participants were asked to walk on a given path until they reached the second post, where they assessed well-being again and additional variables to assess the effect of the forest walk. A path to be followed by participants during the experiment was defined for both the wild and the tended forest. The walking distance was approximately the same and required a similar amount of physical activity, with each route taking 30-40 minutes. Accessibility of both areas was good and the selected path was easy to follow. Both routes shared the same starting and end-points, and a map of the whole area marked the route a participant was asked to walk along (tended or wild forest route). The participants were randomly assigned to one of the conditions (figure 5.3).

Afterwards, due to daytime effects of fatigue and thus a different need for restoration (Hartig & Staats, 2006), we divided the sample into two groups: morning sessions were carried out before 2 pm and afternoon sessions were carried out after 2 pm, assuming stronger mental fatigue in afternoon sessions (Meier-Koll, 2006; Zulley & Knab, 2003).

Participants walked individually to avoid social interaction as an interfering variable. Due to the solitary walks in an urban forest, which might arise perceived threat, we controlled for perceived threat by three items.

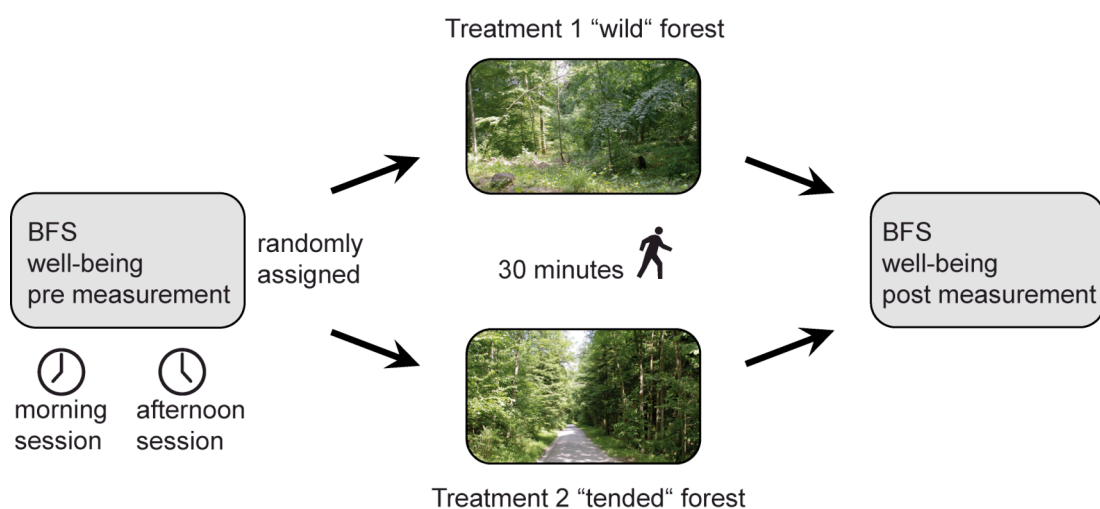


Figure 5.3: Illustration of the experimental procedure

Note: BFS = Scales of well-being (Befindlichkeitsskalen) adapted from Abele-Brehm & Brehm, 1986

5.3.5 Analysis

Reliabilities of the well-being scales were calculated. Except for "reflection" (alpha = 0.77), Cronbach's alpha of each scale was fairly high with values between 0.84 and 0.89 (Table 5.3). Thus, no items had to be excluded.

Table 5.3: Descriptive statistics and reliabilities for well-being scales

Dimension of well-being	Mean	S.D.	Cronbach's alpha
"Depression" (e.g. gloomily)	1.04	0.13	0.89
"Arousal" (e.g. fraught)	1.67	0.27	0.84
"Good Mood" (e.g. joyful)	5.72	0.31	0.87
"Reflection" (e.g. meditative)	4.05	0.13	0.77
"Activation" (e.g. energetic)	4.87	0.11	0.85
"Anger" (e.g. irritable)	0.66	0.07	0.87
"Calmness" (e.g. relaxed)	5.61	0.18	0.87
"Lethargy" (e.g. slack)	1.84	0.19	0.87

Note: Mean and range represent empirical item characteristics (pre-treatment); well-being scores range from 0 (not at all) to 8 (very much); Items translated: item parameters tested for German speaking sample; Cronbach's Alpha represents the scale qualities

Differences of morning and afternoon sessions were tested by the comparison of the well-being means from the pre-measurement for each well-being dimension, representing the baseline.

To test the differences between the morning and afternoon sessions indicating more or less fatigue (hypothesis 3) and the wild and tended treatments (hypotheses 1), we conducted univariate analysis of variance with pre-treatment well-being as a covariate and post-treatment well-being as the dependent variable for each dimension. Since the pre-score was actually measured before the treatment, this is adequate without violating assumptions for covariance analysis (Bortz & Doering, 1995). We calculated the results on basis of an α -error-level of $p < 0.05$.

Looking at hypothesis 2, we first conducted a univariate variance analysis to analyse the influence of forest condition (wild-tended) on assessment. Subsequently, a covariance analysis, according to the procedure described above, was conducted to measure the effect of assessment on the change of well-being and the interaction effects of forest conditions and assessment.

5.4 Results

5.4.1 Testing the possible intervening variables in the experiment

Apart from temperature, weather conditions were comparable for all participants. We tested the influence of temperature on well-being, because temperatures varied between 12 and 28°C. Thus, temperature was grouped in six equal categories. The mean values for these categories did not have a significant influence on neither the eight pre-treatment well-being aspects ($p > 0.13$) nor the pre-post changes of well-being ($p > 0.38$). This led us to the conclusion that the ambient temperature did not influence the treatment.

By randomly assigning the participants to one of the experimental treatment conditions, we expected no differences between groups in well-being before the treatment. This was confirmed by statistical comparison of both treatment groups,

which showed no significant differences in means and variances for the relevant variables.

Additionally, we checked whether circumstances, such as an uneven distribution of age, gender and frequency of nature visits, in the two treatment groups possibly had an influence on the dependent variables. This was not the case ($p > 0.13$), as shown in Table 5.4, the differences between the treatment conditions were not significant for possible interfering variables.

Perceived threat did not show significant differences between the treatment conditions ($p > 2.70$).

Table 5.4: Background variables for participants in sample

Variable	Wild forest condition	Tended forest condition	df	F
Mean age	37.51	37.77	7	0.64
Gender: Percentage male	36.5	52.3	1	2.41
Frequency of nature visits: Percentage “almost daily”	34.6	31.8	1	0.32
Current residence: Percentage urban	84.7	88.6	1	2.50
Ancestry Percentage urban	50.0	56.9	1	0.89
Level of education: Percentage High-school	82.4	79.6	1	0.58

Note: df = degrees of freedom; differences between the wild forest and the tended forest condition were not significant.

5.4.2 Comparison of the impact of wild and tended forest conditions

Hypotheses 1 postulates a stronger positive effect of tended forest conditions on human well-being than wild forest conditions. To test this, we compared the post-measures of well-being between the groups exposed to the wild and tended forest

treatments, using the pre-measures as covariates to exclude the influence of slightly different baselines between the treatment conditions.

Table 5.5: Covariance analysis comparing wild and tended forest conditions

	"wild" forest		"tended" forest		F	df	Error within group
	M	S.D.	M	S.D.			
"Depression"	1.01	1.17	0.45	0.69	8.16**	1	0.58
"Arousal"	1.39	1.31	1.22	1.36	0.80	1	1.34
"Anger"	0.62	0.93	0.33	0.67	0.81	1	0.39
"Lethargy"	1.50	1.40	1.66	1.47	0.01	1	1.39
"Good Mood"	5.69	1.24	6.29	1.13	4.99*	1	0.89
"Reflection"	3.88	1.62	4.50	1.32	2.67(*)	1	1.50
"Activation"	5.05	1.31	5.20	1.63	1.21	1	1.68
"Calmness"	5.65	1.26	6.19	1.20	4.11*	1	1.16

Note: M = post-treatment values, controlled for pre-treatment; mean value, S.D. = Standard Deviation; Error within group in mean squares; (*) $p \leq 0.10$ $p \leq 0.05$; ** $p \leq 0.01$; R^2 for "depression" 0.45, "arousal" 0.26, "anger" 0.45, "lethargy" 0.33, "good mood" 0.42, "reflection" 0.36, "activation" 0.22, "calmness" 0.28

Participants in the tended forest treatment showed a stronger increase of "good mood", "calmness", and a stronger decrease of "depression" than participants in the wild forest treatment (Table 5.5). Other aspects of well-being did not show differences between the conditions. These main effects partly confirm our hypothesis 1, stating that tended forest conditions have a more favourable effect on some specific well-being aspects. Figures 5.4 and 5.5 illustrate the mean values for well-being, grouped by the pre- and post-measurement. Other dimensions of well-being did not show significant differences between the treatment groups, $p \leq 0.38$.

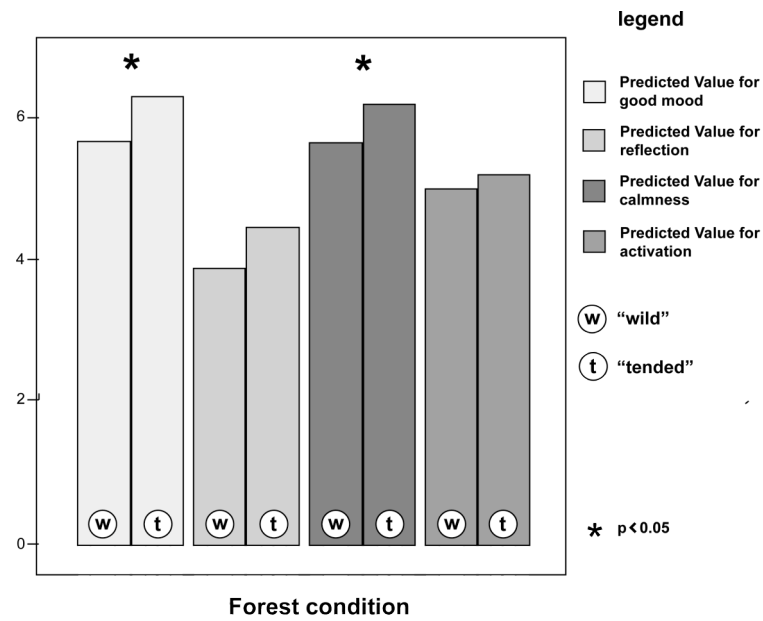


Figure 5.4: Well-being pre-post differences of positive dimensions
Note: Well-being scores range from 0 (not at all) to 8 (very much)

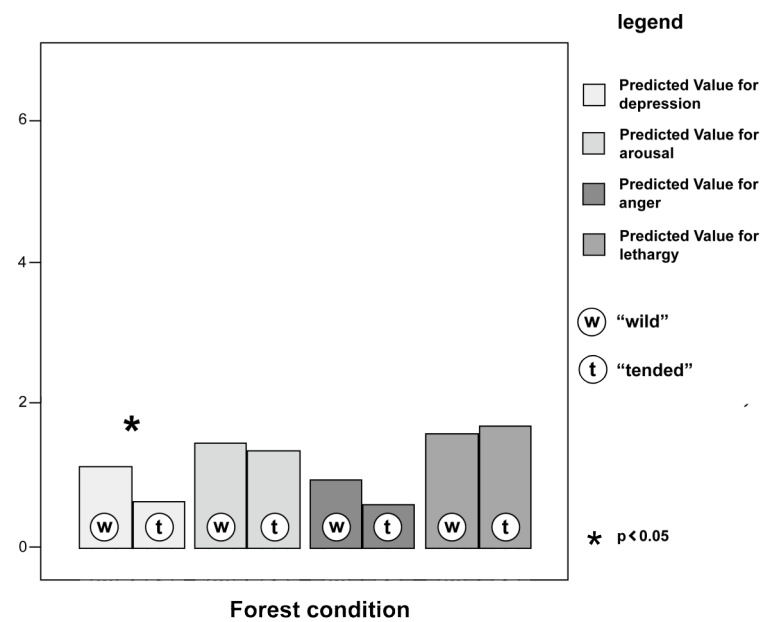


Figure 5.5: Well-being pre-post differences of negative dimensions
Note: Well-being scores range from 0 (not at all) to 8 (very much)

5.4.3 The impact of aesthetical evaluation on well-being

The second hypothesis postulates differences in well-being according to the individual aesthetical evaluation of the wild and tended natural conditions. However, contrarily to our hypotheses 2, the comparison of individual evaluation of the perceived natural environment did not show significant differences between the wild and the tended natural conditions ($F(1/94) = 0.85, p \leq 0.40$).

Using assessment as the independent variable and using maintenance wild versus tended as factor in a covariance analysis, we found a significant influence of assessment on well-being change on "depression" only: when the natural area was assessed very positively, the decrease of "depression" was significantly stronger, ($F(1/94) = 2.782, p \leq 0.05$) than with lower aesthetical assessment. Other dimensions of well-being were not affected by the evaluations of the perceived natural area.

5.4.4 Individual needs for restoration

The baseline of well-being aspects was compared between morning and afternoon sessions (before and after 2 pm) to see whether the participants differed in mental fatigue. The baselines of six well-being dimensions (namely "depression" "arousal", "good mood", "reflection", "anger" and "calmness") did not differ significantly between the morning and afternoon sessions, whereas "activation" and "lethargy" baselines showed significant differences. Participants in morning sessions (before 2 pm) had higher mean values in "activation" and lower mean values in "lethargy" than participants in afternoon sessions after 2 pm, indicating less fatigue (Table 5.6).

Table 5.6: Descriptive statistics for well-being dimensions (pre-measurement), grouped by morning and afternoon sessions

	Morning session		Afternoon session	
	M	S.D.	M	S.D.
"Depression"	1.11	1.16	1.49	1.75
"Arousal"	1.72	1.40	2.27	1.75
"Anger"	0.71	0.93	0.99	1.46
"Lethargy"	1.58	1.43	2.59	1.98
"Good Mood"	5.77	1.28	5.25	1.75
"Reflection"	3.90	1.34	3.79	1.62
"Activation"	5.11	1.47	4.13	1.57
"Calmness"	5.57	1.51	5.00	1.89

Note: M = mean values, S.D. = standard deviation; Well-being scores range from 0 (not at all) to 8 (very much)

The changes of well-being after the treatments were marginally stronger in the afternoon sessions, especially for the dimensions "activation" and "lethargy". However, the differences between the more and less fatigue group failed to show significance when tested in a covariance design.

No interaction effects of the forest condition (wild and tended) and the fatigue (morning or afternoon sessions for more or less fatigue) were significant ($p > 0.26$ to $p > 0.91$). This indicates that the forest conditions do not have a different effect on well-being dependent on fatigue.

5.5 Discussion

We investigated the influence of wild and tended urban forest conditions on human well-being. In an in-situ experiment we focused the between-group differences in

well-being after a walk through wild or tended forest. Confirming earlier studies (e.g. Hartig & Staats, 2003), we showed an overall positive influence of natural environments on human well-being, for both wild and tended urban forests. Negative aspects decreased after the treatments, while positive aspects increased. Additionally, this result shows our research design to be sensitive for changes after 30 minutes. However, our research interest went further, expanding earlier work on the effect of different natural environments on human well-being. The structure of the discussion follows the research questions formulated in the introduction part of the article.

5.5.1 Do wild and tended forest conditions influence well-being differently?

Our hypothesis, predicting a stronger positive effect of tended forest on human well-being, was partly confirmed. Some well-being dimensions show a stronger change after the tended forest than the wild forest walk: "good mood" and "calmness" increased more strongly while "depression" decreased more strongly in tended forests.

The stronger decrease of "depression" after a walk in the tended forest condition could be explained by the lower amount of deadwood in the tended forest condition. Prior studies show that wild forests with a large amount of deadwood lead to "sadness", when the people perceiving it were not informed about vital functions of deadwood (Hunziker, 2000). In the wild forest, a smaller decrease of "depression" might be due to the larger amount of deadwood revealing "sadness", since the participants of both treatment conditions were not informed about the function of deadwood. Even if we randomized the sample to the treatment conditions, assuming the same amount of knowledge between the conditions, we did not control for the knowledge about deadwood, thus this needs to be looked at in further research.

Findings concerning the "good mood" aspect, consistent with hypothesis 1 support earlier results, which showed "pleasure" rising more strongly in accessible and low density natural environments similar to those represented in the tended condition (Staats et al., 1997). Staats et al. found accessibility to have a stronger influence on "pleasure" than density. We argue that density is strongly responsible for the

difference between both natural conditions in this study, because accessibility was not an issue here: accessibility was equally given in both experimental conditions. Yet density was different between the conditions, with more density presented in the wild forest condition, assumingly responsible for the differences in well-being.

"Calmness" increased more strongly in the tended forest when compared with the wild forest. We suggest that this increase is due to a moderate complexity in the tended forest. With increasing complexity the preference of natural environments decreases according to Kaplan and Kaplan's information processing theory (Kaplan & Kaplan, 1989).

Another possible explanation for a more positive effect of a forest with a lower complexity and density might be a lower perceived threat (Herzog & Kutzli, 2002). Thus, we controlled for this and showed no differences between the wild and tended forest condition, excluding perceived threat as an explanation for the found group differences.

5.5.2 Does the attractiveness of environments have an influence on well-being?

In contradiction with earlier findings showing that well-being arises from the positive evaluation of environments (Van den Berg et al., 2003; Laumann et al., 2001), we did not find an effect of self reported attractiveness on human well-being as expected in our study. However, this might be due to the research designs: while participants rate more than one scene in repeated measures designs to assess attractiveness (Laumann, Garling & Stormark, 2003; Herzog & Kutzli, 2002), participants in this study rated one natural environment only, avoiding a comparative assessment between different environments. Thus, participants' answers were not biased by individual preferences arising from the comparison of different scenes.

The close connection between attractiveness of environments and the effect on well-being found in previous studies, assuming a person would self-evaluate well-being higher after looking at preferred natural scenes, needs to be looked at more detailed. Depending on what is asked for, whether it is preference, the judgement of beauty or

both, different results are expectable (Arthur, Daniel & Boster, 1977). Preference and the judgement of beauty both rely on perceptions and aesthetic standards, but we need to question how psychological well-being is connected with these concepts.

Our results could not confirm the strong relation between aesthetic assessment and affective responses, but even without differences in aesthetic assessment, differences in well-being are shown.

5.5.3 Do individual needs for restoration play a role in the effect of environment on psychological well-being?

The baseline of well-being differed on the dimensions "activation" and "lethargy" in morning and afternoon experimental sessions. In morning sessions, people showed higher values in "activation" and lower values in "lethargy" indicating less need for restoration compared to people in afternoon sessions. This is consistent with Hartig and Staats, who used time of the experiment as an indicator of mental fatigue (Hartig & Staats, 2006). Consistent with earlier findings (Hartig et al., 2003; Hartig & Staats, 2006; Hartig et al., 1991; Staats & Hartig, 2004; Staats et al., 2003), the change of "activation" and "lethargy" was stronger for fatigued persons. However, the difference between the more and less fatigue groups failed to show significance.

Interestingly, other well-being dimensions apart from "activation" and "lethargy" were not influenced by the time of day. We propose these two dimensions of the multidimensional well-being scales (Abele-Brehm & Brehm, 1986) represent an indicator for mental fatigue, which has been measured separately in previous studies (Gathright, Yamada & Morita, 2006; Ulrich et al., 1991; Van den Berg et al., 2003).

With regard to wild and tended forest, the more and less fatigued groups did not show any significant differences between the forest conditions. In the case of "activation" and "lethargy", we propose that the physical activity probably had a stronger influence on mental fatigue than the forest condition, since exercise is an important aspect to improve well-being (Pretty et al., 2005; Bodin, & Hartig, 2003; Allmer, 2002).

5.6 Conclusion

Our empirical work contributes to the discussion of different natural environments that serve restoration and human well-being and broadens it by linking it with research facing different effects of wild and tended forests. In an experimental design, we found support for the restorative effects of natural areas and distinguished in more detail between different types of natural environments that tended forests have a more positive impact than wild forests in a daily context on some aspects of well-being.

Our results hint toward principles that could be used when designing natural environments to increase the users' psychological well-being. To create forests providing an ideal resource for psychological well-being, we need to integrate clear signs of maintenance in planning and designing processes, e.g. by creating accessible natural conditions with a moderate density and low amounts of deadwood.

Further research could integrate our results when focussing on the design of environments outside workplaces, (Kaplan, 2007) and environments for specific groups or people with special needs (Getrabet Gulwadi, 2006; Day, 2008). Health promoting environments could enhance the quality of urban green space and derelict land (De Sousa, 2003). Thus, our results could actively support developing and redeveloping processes of such natural areas.

Furthermore, the data could not confirm the strong relationship between assessment and well-being, contrary to other researchers (Van den Berg et al., 2003). Thus, assessment as a predictor for well-being needs to be questioned and further analyzed. Well-being needs to be faced separately from assessment to avoid a bias arising from individual preferences (Arthur et al., 1977). This needs to be considered carefully in the design of natural areas. As various studies have shown, the public should be integrated into planning processes to reach a high acceptance and support (Matthies & Krömker, 2000; Höppner, Frick & Buchecker, 2007). Publicly accepted areas by users get visited most frequently.

However, we point out that the individual assessment might be only one of multiple factors possibly affecting well-being. Well-being seems to be more independent from the individual assessment of physical environments than expected. The experts' perspective, including psychologists besides planners, must be considered strongly when aiming to plan environments supporting psychological well-being. Still, the perspective of users needs to be considered: environments, which are not accepted by the public, will not be used much; thus failing to influence psychological well-being at all. Participation cannot be denied if we consider that the frequency of nature visits increases in positively assessed environments.

Thus, we need to consider both, the aesthetical assessment of natural environments by visitors and the effects of natural environments on the visitors, which is a challenge in further research and planning processes.

5.7 References

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6 Synthesis of the results

6.1 The role of different environments for psychological well-being

"Natural Environments – A Resource for Well-being?" (chapter 3) was concerned with the specific effects of different physical environments on psychological well-being. The literature review revealed a rich body of evidence for a positive influence of natural compared to urban environments. This positive influence has been shown on restoration and well-being, indicating that natural environments can be looked at as an important resource for psychological well-being, especially in contrast to urban environments.

Moving away from the comparison of urban and natural environments, research on the influence of different natural conditions was found to be not as rich. In addition to restorative characteristics (Kaplan & Kaplan, 1989) which are present in natural areas in particular, features such as low vegetation density, visual access, a smooth ground surface, signs of maintenance, and spreading shaped trees were shown to positively influence "preference" and "pleasure", while they negatively influenced "fear", a sense of "danger" and "arousal". The results were shown to be inconsistent with regard to "anger". However, we remark that the measures for well-being used were various, thus making it difficult to compare findings.

Research on the effect of exposure to wilderness has reached inconsistent conclusions. While some studies have shown an increase of happiness in wilderness areas after exposure for several days (Hartig et al., 1991), others have shown an increase in well-being indicators in well-maintained areas, when exposed to the area for time spans of 30-60 minutes (Herzog & Kutzli, 2002; Herzog et al., 2003).

However, we have to bear in mind that the stimulation modes used in the experimental settings were rather inconsistent. They should be complemented by "real exposure" to natural areas conditions, which involve all senses of the participants as well as physical movement. This would enable us to consider negative

effects on well-being, such as "fear" (Milligan & Bingley, 2007), which is questioned to appear in laboratory conditions with participants evaluating photographs. To go a step further in this question, we analyzed the processes released in different natural environments, described in chapter 4.

6.2 Mental processes arising from different natural environments

Chapter 4 "Visiting urban forests – Mental processes causing well-being" dealt with the question what kind of cognitive and affective processes are initiated by different environments from the perspective of users. Natural environments under consideration were wild and tended forest and open land in particular. Individual mental models about relationships between natural environments and well-being merged into a general model, including preconditions, processes and specific attributes of well-being. This model aims to move away from the urban-natural dichotomy by analyzing specific natural conditions that influence psychological processes resulting in well-being.

Usefulness, consisting of two factors accessibility and opportunity to act, serves as an important precondition for well-being and restoration to appear during exposure to natural environments. Everyday and holiday or weekend well-being involve different needs, so clearly, a separation is needed. The model focuses on everyday well-being and aims to analyze cumulative restoration effects in a daily context (Hartig, 2007).

An important factor affording well-being is the contrast to daily life, which was supported by perceived biodiversity. "Anger" and "depression" are shown to decrease more strongly with an increasing perceived biodiversity.

The main process of the model is the focus of mind, consisting of two stages: firstly drifting away followed by secondly the change of perspective. These cognitive processes do not necessarily both appear, but they both provide an increase of mood. This finding is consistent with authors who divide 'being away' into two

components, such as novelty and escape (Laumann et al., 2001) or being away to and being away from (Hammit, 2000). In combination these components provide the most important factors for relaxation (Laumann et al., 2001).

The qualitative model was tested by means of a quantitative experiment, which shows that the positive dimensions of well-being, "good mood" and "calmness" were only marginally affected by the aspects accessibility, natural stimulation and focus of mind. However, as proposed in the model, the negative well-being dimensions "anger" and "depression" were affected significantly, especially by the two components of being away.

6.3 The role of wilderness for well-being

Chapter 5 "Wild or tended urban forests: does it matter for psychological well-being?" was concerned with three questions:

Is there a different impact on human well-being by wild and tended forest conditions?

Are there additional aspects, namely evaluation of the natural condition and ancestry of participants, which influence the impact of different natural environments on well-being?

Do individual needs for restoration play a role in the effect of environment on psychological well-being?

By using a complex model of well-being, including "activation", "lethargy", "good mood", "reflection", "anger", "depression", "calmness" and "arousal", we were able to distinguish different well-being dimensions.

To address the comparison of the effect of wild and tended forests, we show that the tended forest evokes stronger changes in "depression", "good mood" and "calmness". Showing that different natural environments contribute towards well-being differently, these results can actively support planning strategies in urban surroundings, especially in densely built urban contexts. By providing specific

maintenance, natural environments can actively contribute as a resource for psychological well-being.

The assessment of the natural area did not affect the impact on well-being. This is contradictory at first glance, in light of the findings of earlier research that preference for a natural area is closely correlated with well-being (Laumann et al., 2001). This relationship seems to be not as clear as expected and is questioned by our results. We show that the effect on well-being is not dependent on the individual evaluation. This result requires a focus on measures of well-being, rather than predicting well-being by individual assessment toward natural areas. The interrelation between preference and well-being seems to be more complex than previously assumed, and further research is indicated to address causal relationships.

Concerning the third question, the baseline for the need for restoration was different with regard to "activation" and "lethargy", and depended on the time of day. Participants who took part in morning sessions showed higher "activation" and lower "lethargy" levels than participants who took part in the afternoon. The walk in the forest had only a marginally stronger positive effect on more fatigued participants, independent from the forest condition. This fatigue effect does not appear for any other well-being dimensions, shown by similar baselines indicating other well-being dimensions to be independent from time of day. We need to be aware that restorative effects, such as "activation" and "lethargy", do not comprise the whole concept of well-being: Other dimensions need to be addressed in order to support public health. The distinction between restoration and well-being aspects needs to be acknowledged. Well-being is proposed to be a more holistic concept, including restoration, reflection (Herzog et al., 1997) and negative aspects.

7 General Conclusion

The work opens up the perspective of comparing the effects between natural and urban environments, which has dominated restoration research (Karmanov & Hamel, 2008). We have shown that natural environments do not consistently affect humans, but wild and tended forests have a different impact on well-being. Tended forests in the short term have a stronger positive impact on well-being than wild forests. Natural areas can be used actively as a resource for health (Hornung & Gutscher, 1994). Thus the results are important and relevant for the design of urban natural areas. Possibilities of everyday cumulative effects for well-being can be actively supported by maintenance of urban forests.

A precondition for the positive effect on well-being is usefulness, including accessibility and opportunities to act freely. A contrast to daily life reveals a change of the focus of mind. This includes drifting away and a change of perspectives. Well-being aspects induced by natural environments include "calmness" as well as "good mood" and the decrease of "anger" and "depression".

The individual need for restoration depends on the time of day, while other dimensions of well-being are not affected by the time of day. This shows that we need to face a more complex construct than restoration, and to integrate other well-being aspects such as "good mood" and "anger", which also represent important aspects of human health. Tended forests lead to a stronger change in levels of "depression", "good mood" and "calmness". The individual assessment of a natural environment does not show an influence on the change in well-being.

7.1 Research implications

Moving away from the urban-natural dichotomy

The impact of different natural environments on psychological well-being, and shows differences between wild and tended forest conditions. This is only the beginning of moving away from the natural-urban dichotomy (Karmanov & Hamel, 2008), more research needs to be done in this area. Different natural conditions and forms have to be analyzed in future focusing on the comparison of open land, forests, mountain and coastal areas. What processes do these environments elicit? Furthermore, the comparison of more than two natural conditions would be very valuable to analyze the effect of critical points between different natural conditions. Preference studies, dealing with aesthetic assessment of more than two different natural conditions, have a high potential in contributing towards eliciting differentiated hypotheses in this field.

Implementing consistent measures for well-being

The studies in this work operated with a variety of dependent variables. While there is a relative consistency in measuring restoration using the Perceived Restorativeness Scale (Hartig et al., 1997), the dimensions of well-being are rather complex and require an integrative, consistent instrument to measure well-being. To elicit comparable data, a multidimensional instrument is suggested, which includes aspects of restoration.

Using different stimuli presentation modes for the same natural environments

The comparability of the reported studies has been questioned. We suggest designing settings that compare the same stimuli in different presentation modes to control possible effects of the presentation mode itself on well-being, such as video or real exposure. As a walk in natural settings requires some movement, physical activity needs to be systematically integrated in research designs, enabling to look at the effects arising from exposure to nature and from physical activity.

Analyzing large samples including other groups besides students

The samples of former studies have often been students, although the ability to make generalizations to other age groups has been questioned (Zube et al., 1983). This work also included non-academic staff and achieved a higher mean age in the sample. Future research has to continue work with mixed samples, including older age groups, and an approach of representative samples also seems to be worthwhile. Special attention should be paid to specific user groups with special needs (Gesler, Bell, Curtis, Hubbard & Francis, 2004). These research questions would be very applicable for practical implications as well.

Analyzing the time span in combination with natural conditions

This work faces short-term changes in well-being, measured in a cross-sectional pre-post-design. Adjacent research needs to be done on long-term effects of different natural conditions on well-being. This would enable us to analyze the effect of different natural conditions on behavioural changes of people, too, such as pro-environmental and sustainable behaviour (Matthies, Klöckner & Preissner, 2006). Another aspect is the time span used for the nature visit. Differences between everyday and weekend or holiday visits in nature have been shown, but not analyzed in detail. While this work focuses on everyday effects, weekend or holiday visits need to be examined in future.

7.2 Practical implications

The results of our work contribute to the discussion on how to plan natural areas to promote human restoration and well-being. Natural environment can be used as a resource for psychological well-being, understood as a predictor for health, if we deliberately consider the results of these and following studies. Planning processes of cities and urban forests should actively integrate findings about the impact of natural areas on health. Especially in an urban society, this could contribute as a resource

enhancing cumulative restorative effects in daily life and promoting public health. Thus, there is a need to plan urban environments, which are easily accessible for people and which provide different opportunities for acting in the environment. The positive effect of rather tended nature has practical implications. The results suggest that the establishment of wilderness zones should be well considered and should alternate with less wild areas that feature signs of setting care. Urban forests for daily well-being effects need to be maintained, providing little brushwood and deadwood to provide a maximum support in well-being. However, the natural area focused in this study was not an intensively manicured forest and the effect of intensely maintained and economical used natural environments is yet to be analyzed. The results show the importance of distinguishing between natural environments.

Accessibility should be provided to decrease "anger" and "depression" in the everyday use of natural environments and to provide a cumulative restorative and well-being experience. However, this is limited to everyday use of natural areas, and recommendations stating the design of natural areas for the use of longer periods of spare time such as weekends and holidays, are not possible, because this question was not addressed in this research.

Cautious use of qualitative data

This work shows that the qualitative model could only partly be confirmed by quantitative data. This indicates that planning processes should be cautious being constricted to qualitative data only without any validation by perspective triangulation. This is especially obvious when focusing on the preferences of natural environments, which showed to have no influence on well-being. Data from questionnaires on aesthetical preference, commonly used in planning processes, cannot predict the effect on well-being. A more detailed conceptual framework needs to be considered when attempting to implement well-being and health factors into the design and management of urban natural areas.

7.3 References of framework

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Interviewleitfaden zum Thema „Mentale Modelle über den Einfluss von Wald und Natur auf das menschliche Wohlbefinden“

Vorstellung: Ich bin an einem Forschungsprojekt an der Eidgenössischen Forschungsanstalt für Wald, Schnee und Landschaft beschäftigt und befasse mich in diesem Rahmen mit dem Einfluss von Natur auf das menschliche Wohlbefinden. Ich möchte herausfinden, wie sich unterschiedliche Naturformen auf das Wohlbefinden auswirken. Dabei interessiert mich insbesondere ein Vergleich zwischen Wald und Offenland sowie zwischen gepflegten und verwilderten Flächen.

Die Untersuchung erfolgt nach einem qualitativen Forschungsansatz, ich möchte die individuellen Perspektiven unterschiedlicher Nutzer der Flächen erfassen. Dazu ist ihre Perspektive als... (Nutzer, Planer, Bewirtschafter, Mitglied einer Initiative, Spaziergänger) für die Wahrnehmung von Natur für mich interessant. Ihre Ideen des Zusammenhangs von Umwelt und Wohlbefinden sind für die Untersuchung der Fragestellung von hoher Bedeutung.

Das Interview soll auf Tonband aufgenommen werden, um eine Auswertung zu ermöglichen, danach wird die Cassette vernichtet. Wenn Sie Interesse an den Ergebnissen haben, können Sie gern einen Bericht bei mir anfordern, den ich nach Abschluss der Untersuchung anfertigen werde. Wenn Sie keine Einwände mehr haben, werde ich das Tonband jetzt starten.

	Offener Gesprächsanstoss	Theoriegeleitete, hypothesengerichtete Fragen	Konfrontationsfragen
1. Restoration Psychology	<p>Warum gehen Ihrer Meinung nach die Menschen in den Wald, um sich wohl zu fühlen?</p> <p>Gibt es Unterschiede bei der Wirkung verschiedener Natur?</p> <p>Welche Eigenschaften der Umwelt rufen einen positiven/ negativen Effekt auf die Erholung hervor?</p>	<p>Hat ein Spaziergang in der Natur einen Einfluss auf Ihre Leistung? (Konzentration...)</p> <p>Wie regenerieren Sie Ihre verbrauchten Ressourcen nach einem anstrengenden Arbeitstag?</p> <p>Fehlen von Anforderungen als erholungsfördernd wahrgenommen?</p>	<p>Wenn es Ihnen um die Erholung durch Bewegung geht, könnten Sie doch auch im Sportverein/ Fitnesscenter Übungen machen. Warum hier?</p>
2. Aufmerksamkeits-Erholungs-Theorie	<p>Welche Merkmale der Umwelt wirken positiv auf Ihr Wohlbefinden?</p> <p>Was übt in solchen Situationen, wenn Sie die Natur besuchen, einen Einfluss auf Ihre persönliche Stimmung aus?</p>	<p>Welche Rolle spielt für Sie die Faszination an einer Umwelt?</p> <p>Ist es wichtig für Sie, räumlich von Ihrem Alltag getrennt zu sein?</p> <p>Extent: Erfahrung von Weite</p> <p>Compatibility: Übereinstimmung mit eigenen Vorstellungen und Zielen</p> <p>Ist es für Sie wichtig, Ihre Aufmerksamkeit auf die Natur zu richten?</p>	<p>Fasziniert kann man auch durch einen anspruchsvollen Film im Fernsehen werden. Warum Natur?</p>

3. Stimulationsansatz	<p>Wie sieht ihre Lieblingsnatur aus (Art, Zustand)?</p> <p>In welcher Natur fühlen Sie sich besonders wohl?</p>	<p>Was an der Natur ist für Ihr persönliches Wohlbefinden besonders wichtig?</p> <p>Was reizt Sie besonders an dieser Umwelt, warum kommen Sie her? (Kohärenz, Lesbarkeit, Komplexität, Mysteriosität)</p>	<p>Wenn besonders ... (z.B. Verwilderung) einen Einfluss auf Ihr Wohlbefinden ausübt, wie wirken dann für sie gepflegte natürliche Flächen?</p>
4. Kontrollansatz	<p>Wie gehen Sie vor, wenn Sie die Auswahl Ihres Naturgebiets zum Spaziergang aussuchen?</p>	<p>Ist es wichtig für Sie, den Überblick über die Natur zu erhalten?</p> <p>Haben Sie einen Einfluss auf die Ausgestaltung der besuchten Natur? Wie wirkt sich das auf Ihr Wohlbefinden aus? (Partizipation, Beeinflussbarkeit)</p> <p>Wie wichtig ist Ihnen die Möglichkeit, Einfluss auf das Naherholungsgebiet auszuüben?</p> <p>Ist es wichtig für Sie, den Weg durch die Natur selbst bestimmen zu können?</p> <p>Selbstwirksamkeit?</p> <p>Bewegungsfreiheit?</p>	<p>Wenn Sie gern... (z.B. eine gut überschaubare Natur) genießen, wieso nutzen Sie dann nicht Parks (wie z.B. ... Park in vergleichbarer Distanz)</p> <p>Sie haben erwähnt, dass es Ihnen ... (unwichtig/ wichtig) ist, bei der Ausgestaltung mitzuwirken. Wieso hier? Ist die Möglichkeit gegeben?</p>
5. Kongruenzansatz	<p>Inwieweit werden Ihre persönlichen Wünsche in einem Naturaufenthalt erfüllt?</p> <p>An welchen Orten hier halten Sie sich am liebsten auf? Warum?</p> <p>Wodurch zeichnet sich der optimale Ort zum Wohlfühlen?</p>	<p>(Bedürfniserfüllung - Regeneration - Privatheit - Sicherheit - Funktionalität - Ordnung - Kommunikation - Aneignung - Partizipation - Ästhetik - Kreativität)</p> <p>Wie wichtig ist es für Sie, in der Natur Ihre Bedürfnisse nach z.B. ... erfüllen zu können?</p>	<p>In einem ... (ungepflegten, wilden Wald) herrschen strikte Regeln, wie vereinbaren Sie das mit Ihrem Wunsch nach Mitbestimmung?</p>
6. Einfluss von Wildnis		<p>Wildnisbesucher aktiver</p> <p>Welchen Einfluss hat die Abwesenheit täglicher Belastungen für Sie?</p> <p>Durchgängigkeit und Dichte von Wildnis</p>	<p>Sie haben erwähnt (...) dass Sie in der Natur eine räumliche Trennung von der Arbeit genießen. Das ist bei Ihnen zu Hause auch der Fall. Warum nicht dort?</p>

Soziodemographische Daten

- Geschlecht
- Alter
- Familienstand
- Wohn- und Herkunftsort (Stadt/ Land)
- Ausbildung
- Durchschnittliche Anzahl und Dauer der Aufenthalte in der Natur
- Welche Aktivitäten/ Erfahrungen mit Natur?
- Welchen Stellenwert/ welche Beziehung zu Natur?

Abschlussfragen

- Zufriedenheit oder gewünschte Landschaftsveränderungen?
- Wahrnehmung, Gefühle hinsichtlich des Interviews



Universität Zürich

Projektleitung:

Dr. Nicole Bauer

Projektbearbeitung & Kontakt: Dörte Martens

Eidg. Forschungsanstalt WSL
Abteilung Landschaft & Gesellschaft
Zürcherstrasse 111
8903 Birmensdorf

doerte.martens@wsl.ch

Tel.: 044-739 2803

Fragebogen zur Naturwahrnehmung I



Zunächst einmal vielen Dank für Ihre Bereitschaft zur Mitarbeit!

In der Studie geht es um Ihre persönliche Wahrnehmung und Vorstellung von Natur. Alle Daten werden vertraulich behandelt. Sie werden nicht nach Ihrem Namen oder anderen personenbezogenen Daten gefragt. Wir garantieren die Anonymität Ihrer Antworten.

Alle Teilnehmenden können an einer Verlosung von Kinogutscheinen teilnehmen, die im Anschluss an die Studie stattfindet.

Bevor Sie beginnen, beachten Sie bitte folgende Hinweise zum Ausfüllen des Fragebogens:

- Bitte lesen Sie die Fragen und weitere Anleitungen in aller Ruhe durch und beantworten Sie die Fragen spontan: geben Sie an, was Ihnen als erstes in den Sinn kommt.
- Die Bearbeitung des Fragebogens wird etwa (10) Minuten in Anspruch nehmen.
- Bitte beantworten Sie ALLE Fragen, auch wenn Sie sich nicht ganz sicher sind.
- Wenn Ihnen eine Antwort schwer fällt, kreuzen Sie die an, die am ehesten zutrifft. Es gibt keine falschen oder schlechten Antworten.

Bitte verwenden Sie zum Ausfüllen des Fragebogens einen Kugelschreiber. Sollten Sie versehentlich ein falsches Kästchen ausfüllen, so können Sie es zur Korrektur umkreisen und danach das zutreffende Kästchen ankreuzen.

<input type="checkbox"/>	<input checked="" type="checkbox"/>
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1

Wie häufig halten Sie sich in Ihrem Alltag (ohne Ferien und Wochenende) in der Natur auf?

Täglich oder fast täglich	<input type="checkbox"/>
1-2 mal in der Woche	<input type="checkbox"/>
1-3 mal im Monat	<input type="checkbox"/>
seitener oder gar nicht	<input type="checkbox"/>

2

Welche Aktivitäten üben Sie im Alltag (ohne Ferien und Wochenende) in der Natur aus? Wie oft tun Sie dies?

	Nie	Selten	1-3x im Monat	1-2x in der Woche	täglich
Sport treiben	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tiere beobachten	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Picknicken, bräuteln, Feste feiern	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Freunde treffen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hund ausführen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Natur erleben	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Spazieren gehen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... weiteres:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3

Im Folgenden geht es um die Veränderung der Natur mit den Jahreszeiten. Bitte bewerten Sie die Aussagen danach, inwieweit sie auf Sie zutreffen.

	Trifft gar nicht zu	0	1	2	3	4	5	6	Trifft voll zu
Die Veränderung der Natur durch die Jahreszeiten...									
... empfinde ich als sehr spannend.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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4

Der folgende Teil des Fragebogens besteht aus einer Liste von Wörtern. Bitte lesen Sie diese nacheinander sorgfältig durch und entscheiden Sie sofort bei jedem Wort, inwieweit es Ihrem augenblicklichen Befinden entspricht.

	Trifft gar nicht zu								Trifft voll zu										
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... voller Energie	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... besinnlich	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... tatkräftig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4

	Trifft gar nicht zu									Trifft voll zu									
	0	1	2	3	4	5	6	7	8		0	1	2	3	4	5	6	7	8
Augenblicklich fühle ich mich...																			
... aktiv	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... kribbelig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... gut gelaunt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... gelassen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... freudig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... lahm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5

Nun geht es um Naturaufenthalte im Allgemeinen. Wenn Sie sich in der Natur sind, wie gehen Sie dann mit Ihrer alltäglichen Situation um?

Bitte bewerten Sie die Aussagen danach, wie sehr sie für Sie persönlich zutreffen.

	Trifft gar nicht zu						Trifft voll zu								
	0	1	2	3	4	5	6		0	1	2	3	4	5	6
In der Natur habe ich Abstand zu meinen alltäglichen Gedanken.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich komme wieder zu neuen Kräften.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ein Naturaufenthalt macht mir neuen Mut.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
In der Natur entdecke ich neue Perspektiven.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
In der Natur denke ich das gleiche wie sonst auch.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Die Natur lenkt mich von meinem Alltag ab.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
In der Natur kommen mir einige Probleme unwichtiger vor als zu Hause.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich lasse in der Natur alle Probleme zu Hause.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Nun wünschen wir Ihnen zunächst viel Spass bei Ihrem Besuch in der Natur!

Am Ende der Strecke wird einer unserer Mitarbeitenden Ihnen einen weiteren Fragebogen aushändigen, den Sie dort ausfüllen können.

4



Universität Zürich

Fragebogen zur Naturwahrnehmung II



Projektleitung: Dr. Nicole Bauer
Projektbearbeitung & Kontakt: Dörte Martens

Eidg. Forschungsanstalt WSL
Abteilung Landschaft & Gesellschaft
Zürcherstrasse 111
8903 Birmensdorf

doerte.martens@wsl.ch

Tel.: 044-739 2803

Bevor Sie nun den abschliessenden Fragebogen bearbeiten, möchten wir Ihnen die Hinweise zum Ausfüllen noch mal in Erinnerung rufen:

- Bitte lesen Sie die Fragen und weitere Anleitungen in aller Ruhe durch und beantworten Sie die Fragen spontan; geben Sie an, was Ihnen als erstes in den Sinn kommt.
- Die Bearbeitung des Fragebogens wird etwa (20) Minuten in Anspruch nehmen.
- Bitte beantworten Sie ALLE Fragen, auch wenn Sie sich nicht ganz sicher sind.
- Wenn Ihnen eine Antwort schwer fällt, kreuzen Sie die an, die am ehesten zutrifft. Es gibt keine falschen oder schlechten Antworten.

Bitte verwenden Sie zum Ausfüllen des Fragebogens einen Kugelschreiber. Sollten Sie versehentlich ein falsches Kästchen ausfüllen, so können Sie es zur Korrektur umkreisen und danach das zutreffende Kästchen ankreuzen.



1

Bitte lesen Sie die Wörter nacheinander sorgfältig durch und entscheiden Sie sofort bei jedem Wort, inwieweit es für Ihr augenblickliches Befinden zutrifft.

	Trifft gar nicht zu								Trifft voll zu										
	0	1	2	3	4	5	6	7	8		0	1	2	3	4	5	6	7	8
Augenblicklich fühle ich mich...																			
... bedrückt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... ruhelos	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... unbeschwert	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... betrübt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... nachdenklich	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... frisch	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... misstrauisch	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... traurig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... beschaulich	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... ärgert	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... nach innen gekehrt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... locker	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... nervös	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... niedergeschlagen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... gelöst	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2

	Trifft gar nicht zu								Trifft voll zu										
	0	1	2	3	4	5	6	7	8										
Augenblicklich fühle ich mich...																			
... angenehm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... energielos	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... entspannt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... sauer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... träge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... angespannt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... gereizt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... lasch	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... voller Energie	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... besinnlich	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... tatkräftig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... aktiv	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... kribbelig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... gut gelaunt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... gelassen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... freudig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... lahm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3

Im nächsten Abschnitt geht es um die Anwesenheit von Tieren und deren Lebensräume in der von Ihnen gerade besuchten Natur.

Wie viele der unten genannten Tierarten würden Sie in der besuchten Natur vermuten?	Sehr wenige							Sehr viele						
	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Kleinsäuger wie Eichhörnchen, Kaninchen & Mäuse	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vögel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Insekten	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Grosse Säuger wie Fuchse & Rehe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Amphibien wie Frösche, Lurche & Salamander	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reptilien wie Eidechsen & Schlangen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Weitere:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2

Wie häufig halten Sie sich in Ihrem Alltag in der gerade von Ihnen besuchten Natur auf (ohne Ferien und Wochenende)?

Täglich oder fast täglich	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1-2 mal in der Woche	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1-3 mal im Monat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Seltener oder gar nicht	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sie war mir nicht bekannt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4

Im folgenden Abschnitt geht es um die Artenvielfalt von Pflanzen in der von Ihnen besuchten Natur.

Wie viele unterschiedliche Pflanzenarten würden Sie dort vermuten?	Sehr wenige							Sehr viele						
	1	2	3	4	5	6	7	1	2	3	4	5	6	7
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Bitte bewerten Sie nun die von Ihnen gerade besuchte Natur anhand der folgenden Aussagen.

	Trifft gar nicht zu	1	2	3	4	5	6	7	Trifft voll zu
In der Natur, die ich gerade besucht habe...									
... gibt es viele Möglichkeiten, etwas zu machen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... sind die Wege gut begehrbar.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... ist man in seinem Handeln durch dicht gewachsene Vegetation eingeschränkt.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... kann sich die Natur frei entfalten.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... ist der Einfluss des Menschen stark.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... ist es teilweise nicht möglich, durchzukommen (z.B. mit Rollstuhl oder Kinderwagen).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... wird Totholz und Laub aufgeräumt.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... ist man in seinem Handeln durch Ge- & Verbote eingeschränkt.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Nun geht es um Ihre Gefühle und Stimmungen während des Besuchs in der Natur.

	Gar nicht	Sehr schwach	1	2	3	4	5	6	Sehr stark
Bitte geben Sie an, wie stark die aufgeführten Stimmungen auf Sie zutreffen.	0								
Langeweile	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Angst	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sorge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Geborgenheit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bedrohung	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wohlsein	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Spass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Faszination	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sicherheit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Weitere:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Was ist Ihnen an der Natur wichtig? Bitte geben Sie an, wie wichtig Ihnen folgende Aspekte im Allgemeinen in der Natur sind. Anschließend beurteilen Sie, wie stark der gefragte Aspekt in der gerade erlebten Natur vorhanden war.

	Wie wichtig ist es Ihnen im Allgemeinen?							Trifft dies auf die gerade besuchte Natur zu?							
	Sehr unwichtig							Trifft gar nicht zu				Trifft voll zu			
	1	2	3	4	5	6	7	1	2	3	4	1	2	3	4
Mir ist wichtig, dass...															
... ich dort machen kann, was ich möchte.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... ich dort allein sein kann.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... die Natur unberührt ist.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... ich mich gut zurechtfinde.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... die Natur Lebensraum für Tiere bietet.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... die Natur vielfältig ist.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... die Natur anders ist als meine Alltagsumwelt.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... die Natur gepflegt & ordentlich ist.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... ich mich geborgen fühle.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... es etwas Überraschendes zu entdecken gibt.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... die Natur mir Schutz bietet.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... es keine Regeln gibt.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... ich selbst Einfluss ausüben kann.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... Infrastruktur vorhanden ist (z.B. Abfallkörbe & Bänke).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... weiteres:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8

Welche der aufgezählten Elemente haben Sie bei Ihrem Naturrundgang wahrgenommen?

	Gar nicht						Extrem häufig						
	0	1	2	3	4	5	6						
... Autobahngeräusche	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... Vogelgezwitscher	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... Ausblick über die Natur	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... Pflanzen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... Landstrasse	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... Tiere	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... andere Menschen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... Gebäude	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... Motorengeräusche	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... federmder Boden	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... freie Sicht über die Agglomeration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... weitere:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10

Nun möchten wir Ihnen noch ein paar allgemeine Fragen zu Ihrem Naturbesuch stellen.

Wie lang war Ihre Anreise, um an der Studie teilzunehmen?
In Minuten (ca.):

Wie haben Sie von der Studie erfahren?
Durch direktes Ansprechen in der Universität/ ETH ☐
Durch Flyer in der Universität/ ETH ☐
Durch einen Aushang in der Bibliothek, Gemeindezentrum ☐
Durch elektronische Information (Mail, Flyer) ☐
Durch Freunde oder Bekannte ☐
Anders:

9

Was ist Ihnen während des Rundgangs durch die Natur durch den Kopf gegangen?
Bitte geben Sie an, worüber Sie wie stark nachgedacht haben.

Ich habe mich gedanklich beschäftigt mit...

	Trifft gar nicht zu						Trifft völlig zu						
	0	1	2	3	4	5	6						
... der Arbeit, die ich vorher gemacht habe.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... einer aktuellen Problematik eines Freundes/ einer Freundin.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... den Tieren und Pflanzen, die in der Natur leben.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... meinen Zukunftsplänen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... einem Rückblick auf meinen bisherigen Lebensweg.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Wie anstrengend haben Sie den Besuch empfunden?

Gar nicht anstrengend | 1 2 3 4 5 6 7 | Extrem anstrengend

Bitte bewerten Sie, wie sehr Ihnen die gerade erlebte Natur gefällt.

Gefällt mir gar nicht 1 2 3 4 5 6 7 Gefällt mir sehr gut

Was wäre für Sie die optimale Entfernung einer solchen Naturfläche zu Ihrem Wohnort (unabhängig davon, wie Ihre Wohnumgebung tatsächlich aussieht)? Bitte geben Sie die für Sie optimale Entfernung an.

In Minuten (ca.):

Wie hoch schätzen Sie Ihre Fachkenntnis hinsichtlichlich Natur ein?

Sehr gering

1 2 3 4 5 6 7

Sehr hoch

11

Abschliessend bitten wir Sie noch um einige Angaben zu Ihrer Person.

Ihr Geschlecht: weiblich ☐ männlich ☐

Ihr Geburtsjahrgang:

Postleitzahl Ihres Wohnorts:

Postleitzahl Ihrer Arbeitsstelle/ Hochschule:

Haben Sie Kinder?

☐ Nein ☐ Ja

→ Anzahl der Kinder:

→ Alter des jüngsten Kindes:

Wo sind Sie aufgewachsen? Postleitzahl:

Welchen höchsten Schulabschluss haben Sie?

☐ Primarschule
☐ Sekundar-/ Real-/ Bezirksschule
☐ Mittelschule/ Gymnasium/ Seminar
☐ Berufs-/ Gewerbeschule/ Lehre
☐ Fachhochschule/ Universität/ ETH
☐ Anderes

Befassen Sie sich beruflich oder in Ihrer Ausbildung mit Natur, Landschaft oder Ökologie?

Nein ☐ Ja ☐ → in welchem Bereich?

Sind Sie Mitglied in einem Umwelt- oder Naturschutzverein (z.B. WWF, Pro Natura)?

Nein ☐ Ja ☐ → Aktiv-Mitglied ☐ → Passiv-Mitglied ☐

Haben Sie Fragen oder Anmerkungen?

.....

.....

.....

Herzlichen Dank für Ihre Mitarbeit!

Curriculum Vitae

Dörte Martens
Heinrichstrasse 137
8005 Zürich
martens@wsl.ch

Date and place of birth: July 10th, 1973, Rendsburg, Germany

Education

1992	High School Diploma (Abitur)
2002	Diploma in Psychology Technical University of Berlin

Professional Occupation

2003-2005	Research Assistant at Department of Psychology, Friedrich-Schiller-Universität Jena
2003-2009	Instructor for advanced training seminars in communication Systemic Coaching for young scientists
2006-2008	Project leader of mentoring project „Frauschaft Wissen“ Universität Zürich
2005-2008	Doctoral student at Swiss Federal Research Institute WSL, Birmensdorf, Switzerland and Department of Psychology, Social Psychology Division, University of Zürich, Switzerland